SPECIAL issue

GDW

No. 34

CHALLENGE

GDW's Magazine of Futuristic Gaming

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From the Management

The rumors are beginning to fly, and indeed it is hard to keep a lid on news like this. **Challenge** will appear six times next year. We've decided to go bimonthly in 1989 and continue our 80-page format. We also plan to beef up our coverage of additional games—the response to our *Battletech* and *Star Wars* articles has been tremendous. Subscriptions are now offered on a six-issue basis, and the subscription price has been drastically reduced (see the sub info elsewhere in this magazine).

You may also notice that we started a column in issue 33 on Earth in **2300 AD**. We've decided to discontinue the series in light of the enormous detail presented in the **2300 AD** revision. The revision covers the background material in much greater detail than the original edition. To continue with Earth **Challenge** articles would be to repeat a lot of information. And **Challenge** is crowded enough without reiterating those materials.

—Timothy B. Brown

JUST DETECTED

CONVENTIONS

TOLEDO GAMING CONVENTION VI

October 1-2, 1988, Toledo, Ohio. The sixth annual Toledo Gaming Convention will be held at the University of Toledo, Scott Park Campus, Toledo, Ohio. Events will include tournament and demonstration games, a miniatures-painting contest, miniatures-painting clinics, seminars, movies, a game exhibitors' and dealers' room, special events, computer clubs and dealers, and auctions. For more information send an SASE to Mind Games, 3001 N. Reynolds Rd., Toledo, OH 43615, or call (419) 531-5540 M-F 4-8 P.M.

ARIZONA CON GAMES I

October 7-9, 1988, Tuscon, Arizona. This convention will feature open gaming, 16 con-sponsored games and tournaments, **Twilight: 2000, Traveller,** *D & D*, and a variety of wargames. Contact: Arizona Con Games I, PO Box 40998, Tuscon, AZ 85717.

WARGAMERS WEEKEND

October 28-30, 1988, Newburyport, Massachusetts. This convention will be held on the weekend of October 28-30, 1988, at the Disabled American Veterans Hall (DAV), Route 1, Newburyport, MA 01950. The convention will include fantasy role-playing, historical miniatures, and boardgame events and demonstrations. Contact: Chris parker, C/O The Toy Soldier, PO Box 148, Newburyport, MA 01950 (617) 462-8241.

SILVERCON

November 18-20, 1988, Asheville, North Carolina. Silvercon will feature panel discussions, demonstrations, displays, tournaments, gaming, auction, dealers' room, costume contest, and 24-hour video room. Silvercon is dedicated to the memory of North Carolina fantasy author Manly Wade Wellman. Silvercon will donate its profits to Mr. Wellman's widow to help defray her husband's medical bills. Guests will include science-fiction and fantasy writers. For more information, contact: Silvercon, PO Box 8342, Asheville, NC, 21884.

Air Strike Designer's Notes

Air Strike is the natural follow-up to a game like **Air Superiority**, as most players want eventually to explore what it takes to attack ground targets, and to play scenarios where fighters are defending against attack aircraft with specific objectives. This, after all, is the primary reason for the existence of air superiority fighters: to destroy air-to-ground threats. But **Air Strike** should be considered more than just an addition of rules for delivering air-to-ground weaponry. I see it as a vehicle for the gamer to experience what the term "airpower" really means. Airpower, being "force projection," means the delivery of violent destructive power to the enemy from the air. It is not as simple as it sounds, considering the enemy doesn't usually cooperate in the process.

There are many distinct types of attack and strike missions, each requiring different and specifically tailored methods of execution. For example, close air support might involve a low altitude, high speed laydown of cluster bombs against armor, yet an interdiction strike might require a high altitude dive to hit the spans of a bridge with 2000-pound bombs. In contrast, armed reconnaissance is best done at medium altitudes with rockets and cluster bombs. Flak-suppression may warrant mixed techniques, low-level run-ins followed by pop-ups to a few thousand feet to fire barrages of rockets. The complexity of attack missions, involving, as they usually do, three-dimensional maneuvers dangerously close to the ground to meet weapons delivery criteria while under hostile fire, becomes immense. In all, an attack or strike mission is probably the most demanding type of military flying that exists. A single raid, which may require perhaps two minutes in a combat zone, takes literally hours to plan. In fact, planning a strike is a consummate science. I know: I've spent many long hours planning, briefing, and even leading a few.

Against the modern air defense systems of today's military forces, an attack crew must carefully consider every aspect of a mission, from the takeoff to the landing. Every phase is critical, and a mistake at any point could be fatal. When a strike mission is ordered, an aircrew is given a specific target to hit and a specific time window in which to hit

it. Planning is usually done from the target backwards. For example, the kind of target dictates the type and quantity of weapons to be used, which determines the load the aircraft must carry, the speed at which it can fly, and the fuel that it will use. This, in turn, dictates the flight profile which the aircraft must follow; from this the time needed to reach the target is calculated and used to determine when the takeoff must occur. No two attack missions are ever the same, either. A hundred things must be considered beforehand: the expected weather, the nature of the defenses, the weapon delivery profile, the effectiveness of countermeasures, the capabilities of the aircraft and crew, and the availability of support units like AWACS, tankers, Wild Weasels, and rescue forces. A little flexibility to allow for human errors and unexpected contingencies must also be built into the plan. When complete, all the crews involved must be thoroughly briefed, and only then can the raid be attempted.

Air-to-ground attacks against today's heavily defended targets will almost always involve tense, fast-breaking action and sudden death. As a young lieutenant planning strikes, what donned on me, though it's seldom discussed within the squadrons, is the fact that attack jets are the "poor bloody infantry" of aviation. Attack pilots will be the ones exposed to the heaviest direct enemy fire, and losses

will be high. It has now been officially estimated in several studies that a carrier's striking power is only good for three days of missions in a high threat environment. The Argentines figured their attack crews survived an average of 3.5 missions in the Falklands War. NATO, in its most pessimistic mood, estimates 600 tactical jet losses in the first few weeks of a future war. It is true that attrition will be high unless the enemy is overwhelmed in numbers and technology, as in the Bekaa Valley actions of 1982 and Libya in 1986. Playing **Air Strike** a few times will bear this out. Near perfect plans and attacks can be devised to beat any defense, given time and superior intelligence; however, as with everything else in war, nothing goes according to plan, nor is there ever sufficient intelligence when it's needed.

But what I like most about the **Air Strike** module is that it gives the players of **Air Superiority** a chance to see the other side of the coin, to develop a feeling for what it takes to perform attack and strike missions in the face of various enemy defenses. The scenarios allow the players to skip the tedious planning process and throw themselves right into the action, where they must immediately contend with the strategies of how to best evade the defenses and deliver ordnance effectively on the target. While the rules may emphasize weapon delivery parameters and techniques, which is the
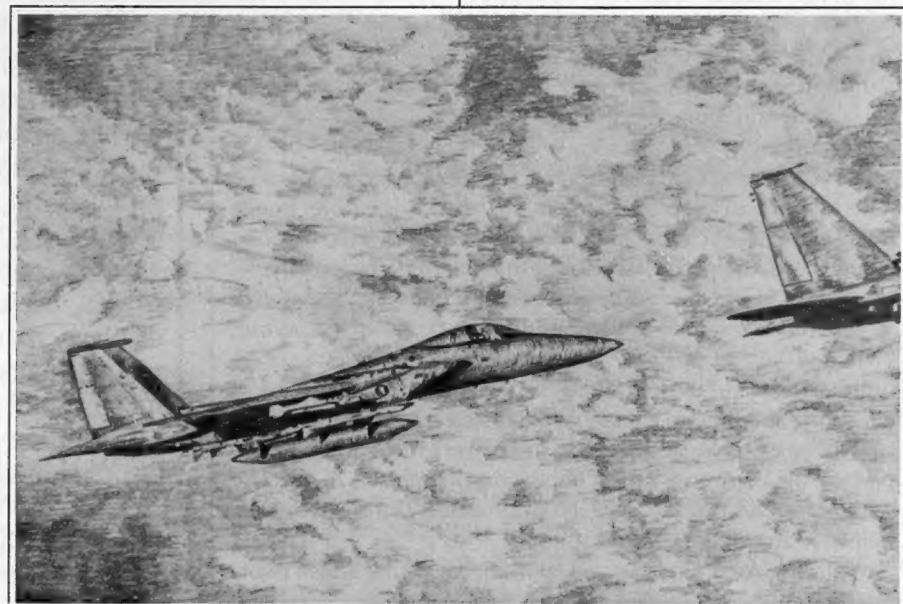
methodology of ground attack, the play of the game emphasizes penetration tactics and target destruction, which is the essence of ground attack. Learning to survive and to achieve target destruction is the challenge that makes **Air Strike** as much fun or more fun to play than **Air Superiority**.

Incidentally, I'd like to mention here that the scenarios put you into the attack crews' version of "Nightmare on Elm Street"; that is, against heavily defended targets and tough odds, which is not a smart idea if you want to live long, though it's often necessary. The ideal attack mission, which we always try to plan for, is the one where we catch the defenses totally off guard, paste the target, and leave while the gunners are still running to their weapons and the interceptors are just warming their engines—a great situation for the attack pilots, but not for balanced gaming.

A MiG shot down is a headline in the paper and a medal for the victor; a supply dump blown to oblivion is one or two tank divisions halted in an offensive!

You will notice that **Air Strike** meshes in well with **Air Superiority**, and this was not simply by chance. Several years ago, when I designed the whole game system, I meant to include air-to-ground play, which in fact helped me choose the scale to use. Air combat could easily be broken down into smaller time segments, but trying to simulate a ground raid with a 20-mile run-in, lasting several minutes at five seconds per game turn or less, would require too many maps and too many turns of play. When GDW got its first draft of the rules, it was a monster game with air-to-ground actions included. The first decision made was to break it into two parts: air-to-air rules followed by air-to-ground rules. We didn't want potential buyers to see another giant unplayable game and back off. An unseen benefit is that with the extra time taken, **Air Strike** was developed and cleaned up quite a bit. My original rules were full of holes and ambiguities caused by oversimplification. The success in sales and popularity of both **Air Superiority** and **Air Strike** shows that this was a good move by the company, although for me, as an outsider and an amateur designer, the extra time and work required to see my pet project in print was (seemingly) interminable.

The playtesters, God bless them (fanatics one and all), worked hard with me to keep the game as playable as possible, hence the release point charts and other play aids that have been included. You, the player, will notice that the rules, though many, remain basic and common-sense. Due to the scale, SAMs, like air-to-air missiles, have envelopes that can be flown in and out, giving a sense of purpose and perspective to the game. AAA units were made battery-sized to bring their probabilities of damaging aircraft into gameable parameters. As in **Air Superiority**, a game of **Air Strike** will cycle the players through these key phases of a ground attack mission: 1) ingress; 2) defense penetration and/or evasion; 3) target acquisition; 4) weapons delivery; and 5) egress and escape.

In playing **Air Strike**, you will soon discover that attack pilots

are the unsung heroes of military aviation, the equivalent of pro football linemen doing the dirty work while others get the glory. Shooting down airplanes is glamorous but does not win wars. A MiG shot down is a headline in the paper and a medal for the victor; a supply dump blown to oblivion is one or two tank divisions halted in an offensive! You tell me which one contributes most to the war effort. As an ex-attack pilot, I have my own biased opinion, and I've also heard Air Force A-10 attack guys say, "You can shoot down all the bad guys you want, but if you return to your base and the enemy's eating in your mess hall, brother, you've just lost the war." Have fun, gents!

POSTSCRIPT

Challenge has been kind enough to allow me to have a column for the **Air Superiority/Air Strike** system (actually, Loren ordered several of the **2300 AD** star cruisers to sit around my house and make sure I provide one). I will try to make this happen since there is so much more that can be done with the system. If I can keep up the pace, then it will be a regular feature.

I still don't know what format this column will take, but I intend to feature new scenarios and aircraft data cards on occasion, and to talk tactics in terms of game mechanics on a regular basis. Articles and rules ideas from the readership, as well as questions and answers on game rules, will be included. In the last issue, I reviewed the 1987 **Air Superiority** tournament, and this time I'm offering some of my thoughts on **Air Strike**.

The future of the game system as a whole looks bright. The playtest on the Middle East supplements is complete. In case you're wondering, the Middle East supplements will include rules for individual pilot quality and feature a lot of early jets, the Vampire, the Meteor, MiG-17, MiG-19, Mystere, Hunter and Mirage-IIIC to a name few, as well as newer jets like the Kfir, MiG-25 and others, plus around 40 new scenarios. They are a mix of **Air Superiority** and **Air Strike** actions.

—*J.D. Webster*

Mobile Artillery—Mortars

An often-neglected piece of weaponry today is the mortar, and it is unjustly criticized as a cheap, ineffective, and obsolete nuisance. Mortars have also gotten a "bum rap" from most wargamers and rules, but this is very unfair. If mortars are so poor, why does every major army in the world still insist on having them?

The answer is simple: They are effective for their purpose! They are highly mobile, easy to handle, require few crewmen, and can be set up very quickly. Mortars are indirect fire weapons with a high trajectory, and are fired from a thin-walled tube that may or may not be rifled (to produce a spin on the projectile for accuracy). Today they are even more deadly, with improved accuracy, and even rocket-assisted types are now in use. Almost every western army (NATO, etc.) uses an 81mm infantry mortar, and the Warsaw Pact uses an 82mm infantry mortar. Mortars range in size from 51mm to 240mm and are carried by infantry as well as specialized mortar carriers. Some countries use only mortars as their light artillery armament.

Mortars are the most mobile artillery in the world and are the easiest artillery to use. They can provide fire support much more quickly than any other method, including artillery, air support, or shore bombardment. This is because of two basic realities: First, they may be attached to your unit, or more often in direct support of your unit; second, they can be set up to fire or switched from a different target much more easily than other artillery. Mortars require small crews, from a minimum of one man up to a crew of 10. Mortars of small size (82mm and below) commonly use only two crewmen, and can be easily handled by a single man! Medium-sized tubes (90mm-120mm) often have a crew of four to five men, but can be used by a single man if already in place.

Today, mortars are more important than is given credit. They provide vital fire support with smoke, illumination, chemical or high explosives, and can put rounds on the FPF (Final Protective Fire Zone) faster than other fire support and at the highest fire rate. It is absolutely essential that mortars are in the inventory of the Division '86 system. The M-1 Abrams tank and the M-2 Bradley personnel carrier do not carry smoke rounds or WP (white phosphorus) rounds. (They do have smoke projectors, but that only covers the area immediately around the vehicle and must be reloaded from the outside.) Tank cannons do not have the high trajectory needed to fire illumination (flare) rounds. The 81mm mortar has the best overall illumination round of all NATO artillery!

The Soviet AM-82 (automatic 82mm mortar) can put more smoke rounds on target faster than any other weapon in the world. In five minutes one platoon of AM-82s can cover a frontage of over 1750 meters with smoke. All mortars can put steel-on-target (rounds landing on target) faster than other artillery (howitzers and cannons).

Another vital fact of mortars' value is the speed of setup and movement. On today's battlefield, triangulation on the firer can be as quick as the second volley (or round) of fire. Most likely, artillery location will take longer, as most of the time you don't sit around with the lasers and radars on, but it is still vital to fire as few times as possible before moving. Even when the firer is located, the targeting data takes two to three times as long to relay to the counterbattery fire direction if firing with nonmortar artillery. Since the mortars are highly mobile, and easy to set up and fire, they are much less vulnerable to counterbattery fire.

Mortars are much more mobile than other artillery. They can reach areas that are only accessible by foot (much easier than other artillery). They can be carried by foot troops, and can do a hip-shoot (stop movement and set up and shoot) much more quickly than howitzers or cannons. It is much easier to align the
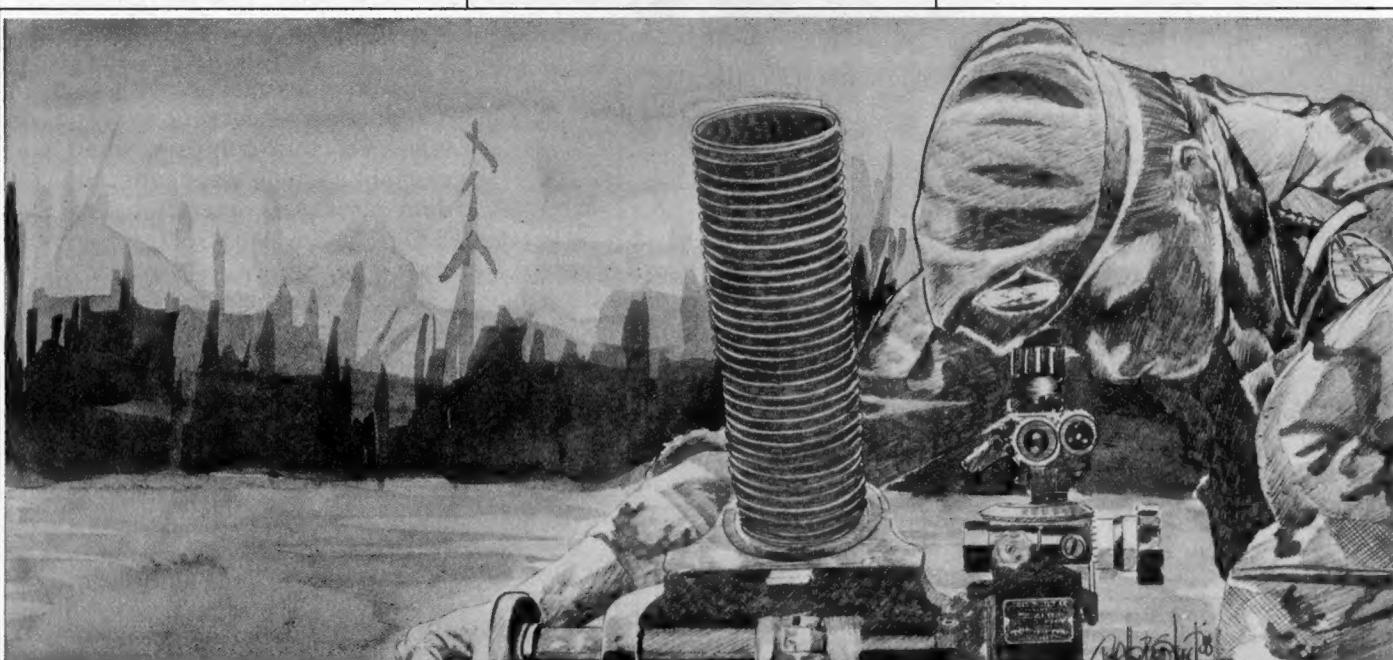
guns than other artillery. A hip-shoot can be done in less than two minutes by good mortar crews (anything under 10 minutes for howitzers is considered good), and they can repack and move out three times as fast as other artillery!

Mortars are not the answer by themselves, and must be accompanied by good conventional artillery for maximum effectiveness. They do have liabilities and shortcomings. Mortars carry less total rounds than other artillery, as they must either be carried on foot (for infantry mortars), or in the same vehicle as the mortar itself (for motorized mortars). Artillery batteries have separate ammo carriers and can thus carry more total rounds. Mortars have shorter range than other artillery and the firepower is less than the "King of Battle" (artillery). Mortars do have a higher trajectory (arc of fire) than other artillery and are therefore better for firing illumination rounds.

Mortars are very important in today's small brushfire wars and are favored by guerrillas. They were used by the Viet Cong and NVA as the primary weapon for fire support. In Afghanistan they are being used today along with rocket batteries as the primary artillery of the Afghan rebels. Their mobility and cost make them the choice for fire support by most shoestring armies.

TYPICAL MODERN MORTAR DATA

Country	Type (mm)	Weight (lbs)	Range (m)	Rate of Fire (rds/min)	Crew (men)
USA	M224-60	46.5	3490	20	1-2
USA	M252-81	89.0	5625	15	3-5
Britain	51	10.2	800	20	1
Britain	81	80.0	5800	15	4-5
Israel	60	321.0	2555	20	2-3
Israel	160	3750.0	9600	8*	5-7
USSR	82	125.0	3040	12*	4-6
USSR	240	7940.0	9700	6*	8-12
France	120	1280.0	8135	10*	4-7
			13,050†	10*	4-7

*=approximate

†=with PRPA rocket-assisted projectiles

Note: The Soviet AM-82 automatic mortar has a cyclic rate of fire of over 120 rounds per minute and can cover an entire Soviet regiment in two to three minutes.

The French have long been leaders in mortar development, and the firm of Hotchkiss-Brandt has developed a rocket-boosted round. This PRPA RAP round has extended the range of their 120mm mortar from 4250 meters to 6550 meters. They have also developed a "gun mortar," which has the barrel mounted in a recoil system inside the turret of the Panhard M3 APC or EMC 81mm mortar carrier. This allows the mortar to fire on a flat trajectory, giving it direct fire capabilities. It is also breech loaded, which allows fire from inside the turret, allowing maximum protection for the crew and not requiring an open-topped vehicle.

With the exception of the French, most nations use modified APCs (armored personnel carriers) for mounting mortars on vehicles. These require open tops for firing and loading, and therefore are criticized for crew protection from overhead fire. (The French gun mortar may be the solution.) The advantage in mobility and speed of these vehicles is augmented by the fact that they carry the base plate with them and can be used outside and away from the vehicle. This allows the crew to reach areas inaccessible to vehicles, or to take the weapon from a disabled track and still use the mortar.

Mortars are assigned to the battalion level, with six 81mm motorized mortars to the platoon for DIV 86 armor or mechanized battalion. The platoon is led by a first lieutenant and SFC (platoon sergeant), and consists of two command post carriers which comprise the FDC (fire direction center), and two sections of three mortar squads each. They also have one squad of observers (FIST team), and the platoon can be split into two sections, each with its own FDC and three mortars. Mortars are usually employed 35-40 meters between each tube and placed behind hills on the forward edge of treelines. The platoon can concentrate fire even when the sections are separated, and the preferred method of advance is to move forward in "bounds," with three subsequent firing positions 2000 meters apart, planned by map or visual recon. One section will be set up and ready to fire, while the other section moves to the next position. The moving section can always stop and do a "hip-shoot" if additional fire support is needed. Generally, the lead section is about 1000 meters to the rear of the battalion's leading elements. One section would be led by the platoon leader and the other by the platoon sergeant.

A hip-shoot can be done in less than two minutes by good mortar crews (anything under 10 minutes for howitzers is considered good), and they can repack and move out three times as fast as other artillery!

When retrograding, the opposite of the above would be used. The total personnel assigned to the platoon would be one officer and 44 enlisted, or 45 men, two jeeps (M151 quarter-ton truck utility), two M577 command tracks (the FDC), and six M109 mortar carriers (81mm carrier). Each section would be led by a section sergeant E-6, and each mortar would have a squad leader E-5, driver E-3, gunner E-4, assistant gunner E-3, and ammo bearer E-2 or E-1. The platoon leader and platoon sergeant each have a driver (E-2 or E-1) assigned to them, and the headquarters section has a RTO (radiotelephone operator). Each section sergeant has two FDC personnel, a driver, and an RTO in his M577 track.

In conclusion, artillery, the "King of Battle," may be the greatest single killer on the battlefield; however, mortars are vital to fire support. Mortars are able to provide the best illumination and smoke support, and they can also give much closer and faster indirect fire than artillery can give. Mortars are ideal for attacking targets on reverse slope in narrow ditches or trenches, and any other area that is difficult to reach with low-angle field artillery or direct-fire weapons. Mortars are an important part of the "combined arms team" system of today's battlefield. Mortars may be relatively inexpensive and simple, but they certainly cannot be called "cheap" anachronisms!

—*Harold D. Martin*

The Compleat NPC

A non-player character is definitely one of the most important components in a role-playing game.

However, the NPC is also one of the hardest to craft properly and realistically. Consequently, the NPCs are nothing more than bulletstoppers in many role-playing games.

NPCs are human beings (well, fictional ones) and, while they do make very useful casualties, they also possess the potential to greatly entertain the players through their interactions. In order for this potential to be used, an NPC must be well rounded and defined very extensively in terms of both physical and mental characteristics.

In other words, NPCs must be so real that the players should almost be able to see them. In this article I will present some techniques for expanding on the NPC section in the basic **Twilight: 2000** rules.

PHYSICAL APPEARANCE

Characters are often influenced by what they see. Consequently, the first thing a referee should describe to the players when they approach an NPC is what that person looks like. There are two ways to go about this; however, they use the same component characteristics.

The first method is the "physical tag" method used in the *Price of Freedom* role-playing game. This method takes all physical characteristics into account and chooses a caricature characteristic, that is, the first attribute that players notice about a person's looks. That caricature becomes that NPC's physical tag and is used to define him to players. For example: "The scarred farmer glances at you as you tramp along his fencerow." There, the tag "scarred" immediately creates an image of the NPC playing the role of the farmer. If the players look longer, the referee should describe the farmer's build, eye color, clothing, and provide

```
Name _____
Gender _____
Race _____
Age (approx.) _____
Experience Level _____
Height_____
Weight _____
Build _____
Hair Color_____
Hair Style_____
Beard, Moustache _____
Eye Color_____
Eyeglasses_____
Complexion _____
Clothing Style, Colors _____
Scars or Marks _____
Voice_____
Other Special Characteristics ___
_____
```

more detail about the scarring. The tag method is not a substitute for full descriptions—it is merely a means of making the NPCs more recognizable to players.

The second method, used by *MERC*, is to generate randomly the primary characteristics and then use only those in the description. *MERC* has tables which generate height, weight, hair color, eye color, complexion, and voice. The referee would then read off a characteristic whenever it seemed to be an appropriate time. For example: "The short farmer glances at you and caresses a livid

purple scar running across a dark cheek as your team shuffles along his fencerow."

Both of these methods of describing NPCs work well, but they both require a good background of characteristics. The table on this page, which was compiled from police descriptive techniques, should provide you with a handy form for determining the proper characteristics which are required for a background for either method of description.

Note that not everything on this list must be filled in. Generally, if a characteristic is not mentioned by the referee, the players will assume that that trait fits the average or is unimportant. Nevertheless, in filling out this list, a referee should be as specific as possible, sometimes resorting to a thesaurus in order to find the proper adjective. This specificity will prove to be useful in game play when descriptions are required.

As for the standard attributes of STR, AGL, CON, STA, INT, and EDU, they are determined when the NPC experience level is determined (a table for this is found in the **Twilight: 2000** *Referee's Manual* on page 16). However, a referee should feel free to vary these attribute levels in order to suit the role of the NPC.

MENTAL CHARACTERISTICS

The referee's knowledge of the mental characteristics of the NPC is essential to the proper playing of the character. The mental characteristics comprise motivation and personality.

Motivation is the NPC's goal in "life." It is what the NPC deems worthy of effort and strives to achieve. The basic concept behind motivation is best shown by Clayton Alderfer's E-R-G Theory. Alderfer breaks down all the different types of motivation into three levels—those of survival, relationship, and achievement. The motivations become stronger as one moves down from achievement to sur-

vival, thus, the "lower" needs, once active, will take precedence over the "higher" needs.

For example, a woman who is pursuing a man in order to find romance, that is, to satisfy a relationship need, will tend to deem satisfaction of romantic pursuit less imperative when her survival is threatened by being stranded in the wilderness. She will place more emphasis on satisfying her needs for food and shelter than she will on pursuing the object of her affection. When her survival needs are satisfied, she will resume pursuit.

In game terms, all NPCs will normally satisfy needs at the lower levels before satisfying needs at higher levels. If the satisfaction of lower level needs is threatened, then the NPC will usually ignore the higher level needs and attempt to satisfy the lower level needs again. This should give the referee an idea of how to play the NPC in changing circumstances. If a once-friendly NPC who is characterized by a strong desire for honor suddenly robs the characters, chances are that his satisfied low-level needs have become unsatisfied. Possibly his village was stormed by marauders who left no food for the dozen or so villagers. This is all to say that lower level needs take precedence over higher level needs. The following table classifies the motivations in the referee's manual according to priority.

Achievement Needs: These are needs which motivate people to strive to become the best they can be.

Justice: The NPC views justice as all-important and love of justice as a virtue which should be cultivated.

Honor: "Death before dishonor." The NPC sees honor as a primary achievement need.

Wisdom: The NPC believes that the betterment of one's self is accomplished through the pursuit of wisdom.

War Leader: The NPC sees war as a sort of ultimate expression of humanity. To become skilled at war is to be truly human.

Generosity: The NPC is a good Samaritan. By helping one's fellow human beings, one becomes richer in experience, or at least, less wealthy in shame and dishonor.

Brutal: The NPC believes that violence and sadism are their own rewards. Perhaps this is the character's dark side—one they wish to control or eliminate altogether.

Stubborn: The NPC believes that their way is the one best way.

High Fellowship: The NPC believes friendship is one of the greatest treasures anyone can have.

High Power: The NPC pursues power for its own sake and believes that the true pleasure of life is in manipulating people.

High Violence: The NPC believes that humanity is violent by nature, and that by becoming skilled at violence, one becomes better for it.

Relationship Needs: All people have a need to interact with and gain respect from others.

Charisma: The NPC knows how to get others to do his wishes. By exercising this knowledge, he gains the respect and loyalty of the others.

Pomposity: The NPC desires respect, but he does not know how to obtain it through the use of charisma. Therefore, he attempts to act important and superior in hopes that it will fool another into respecting him.

Love: The NPC has a strong emotional bond of caring with another. This "other" is viewed as highly important and worth making sacrifices for.

Lust: The NPC believes that seduction of members of the opposite sex is a means of obtaining their respect.

Low and Mid Fellowship: The NPC believes that the best way to gain the respect of others is to make friends with them.

Low and Mid Power: The NPC believes that the best way to gain others' respect is by attempting to exercise power in their presence.

Low and Mid Wealth: The NPC believes that money buys respect, so that NPC will attempt to gain as much wealth as possible.

Mid Violence: The NPC is aggressive in dealing with others in hopes that respect can be earned by demanding it.

Ruthlessness: The NPC appears to care little for the welfare of others, although in fact, this is actually an attempt to gain respect by successfully completing any task undertaken.

Survival Needs: Survival is the most basic drive of all. The person who is attempting to satisfy these is attempting to escape from something life-threatening (or at least something that looks life-threatening).

Cowardice: Perhaps the most understandable motivation. The NPC believes that the best way to escape from a life-threatening situation such as combat is to escape physically.

Murder: The NPC is either plotting a murder or attempting to avoid being blamed for a murder. In the former case, one person has made the situation so intolerable that murder is the only option the NPC sees. In the latter case, the NPC seeks to survive by eluding blame.

Selfishness: The NPC views property as a means of escape from death (by starvation perhaps?).

High Wealth: As with selfishness.

Low Violence: The NPC is unafraid of violence performed or threatened. The indifference to violence is actually a mental shield against threats to the NPC's life.

Deceit: The NPC believes that lying will provide an escape from life-threatening situations. Of course, this NPC's definition of "life-threatening" is probably very broad.

In order to use the above listing, a referee must determine on which level the motivations of the NPC fall as determined by the playing card system described on page 15 of the *Referee's Manual.* The NPC will then only operate on those one or two levels of need, and all other needs will be considered satisfied. Normally, the NPC's lower level motivation will be satisfied, and he will be attempting to pursue his higher level motivation. However, when satisfaction of the lower need is threatened, the NPC will change the emphasis of his actions toward satisfying the lower need.

The above system provides a sort of guide for determining in which direction an NPC's actions will carry them. This system not only determines the motivation of NPCs, but the strength of that motivation, as well as any particular manifestations of the motivation. However, personality determines how the NPC acts or goes about satisfying that motivation. The personality labeling tables below are designed to help the referee by randomly determining the general personality types of NPCs.

The tables are developed from British psychologist Hans J. Eysenck's trait theory of personality which hypothesizes that human personalities can all be mapped on a two-dimensional grid measuring neuroticism and emotional stability. This grid

divides the space into four basic personality types: Choleric (quick to temper or anger; Extroverted-Unstable), Sanguine (Cheerful, hopeful; Extroverted-Stable), Phlegmatic (Slow to excite; Introverted-Stable), and Melancholic (Gloomy, somberly thoughtful; Introverted-Unstable).

Each type is subdivided into eight distinct personality "labels" which describe the specific blend of neuroticism and emotional stability. The labels are what a referee should use to get an idea of the role to play when representing an NPC.

To use the tables, 1D8 is required (use 1D10 and roll again on a 9 or 10). The referee rolls to determine the type, then goes to the appropriate table and rolls for the label.

DIE ROLL: 1-2, CHOLERIC

Die Roll	Label
1	Touchy
2	Restless
3	Aggressive
4	Excitable
5	Changeable
6	Impulsive
7	Optimistic
8	Active

DIE ROLL: 3-4, SANGUINE

Die Roll	Label
1	Sociable
2	Outgoing
3	Talkative
4	Responsive
5	Easygoing
6	Lively
7-8	Leadership*

*Leadership is defined as a tendency to lead others on the basis of charisma. The person usually "takes charge" of a situation and depends on knowledge and charisma to get others to follow. He does not have to be charismatic in motivation.

DIE ROLL: 5-6, PHLEGMATIC

Die Roll	Label
1	Calm
2	Even-tempered
3	Reliable
4	Controlled
5	Peaceful
6	Thoughtful
7	Careful
8	Passive

DIE ROLL: 7-8, MELANCHOLIC

Die Roll	Label
1	Quiet
2	Unsociable
3	Reserved
4	Pessimistic
5	Sober
6	Rigid
7	Anxious
8	Moody

The labels are self-explanatory.

These tables do not replace the **Twilight: 2000** motivation tables, rather, they supplement them. The motivations give the goals of the NPC while the personality labels show how he goes about obtaining them.

The generation of NPC personalities helps the referee to define and individualize the actors in the campaign, and it allows him to play them better.

NPC MANAGEMENT

In order to play NPCs, however, a referee must first be able to manage them. He must be able to keep track of their actions, both "onstage" and "offstage." That is, he must know what his NPCs are doing at all times, even when his players are not interacting with them. This seems a formidable task—after all, in the broadest sense of the definition of NPC, there are some 2.5 billion people left on Planet Earth in the world of **Twilight: 2000**. To superdetail and keep track of all of them is not only impossible but ludicrous.

This absurd example shows the first problem which must be resolved in NPC management. Just who among those 2.5 billion people will be detailed and tracked? The only answer is that the NPCs who have a major effect on the PCs of the campaign should be the ones who are so detailed and tracked. The best way to decide major effect is to place all NPCs with which the PCs have a chance to come into contact in one of four categories: major named NPCs, bulletstopping thugs, local color NPCs, and extras.

Extras are the faceless majority of NPCs in a campaign. There is no reason to track them or even bring them to the attention of the characters.

Local color NPCs are those which are really brought to the character's attention in order to evoke a mood or image in the minds of the players. An example would be a young mother already aged by years of war who is seen pushing her infant son in an old wooden wheelbarrow down the road as the PCs drive by in their HMMWVs. She is seen for an instant and then forgotten in the cloud of dust raised by the passing of the vehicles. There is really no reason for the PCs to interact with her, and her role in the campaign is simply to bring about an image to the PCs of the hardship of war.

Bulletstopper thugs are precisely what the name implies. These NPCs are the faceless enemies and allies who usually die in battle and who sometimes ensure that some PCs die with them. Usually, they will simply fight and be forgotten, but they also provide an opportunity to reinforce the human aspects of combat and valor. For example, in a skirmish, the referee may call attention to one soldier, wounded too badly to walk, who crawls desperately towards his fallen weapon to attempt to continue to fight because it is what he has to do. Or he may "showcase" another, who picks up one fallen comrade and attempts to effect a retreat, only to return to battle to retrieve yet another comrade. Despite the ability to showcase thugs, there is no need either to detail or to track them.

The final category of NPC is the major named NPC (they are illustrated in the modules, which makes the referee's job easier, but few referees have an artist available, so they will have to be satisfied with verbal pictures). These are the ones who must be tracked and detailed. The simple definition of the major named NPC is any NPC whose name is learned by the PCs,

and who has the ability to interact with them for more than one encounter. Falling into this category are the major villains of the adventure and their lieutenants, NPCs who join the PCs' unit, some leaders of allied forces, and central and subplot characters. Central characters are those who are attempting to influence the path of the campaign through their actions, and whom the PCs may meet (for example, CIA agents attempting to topple Baron Czarny in Warsaw who go about independently of the PCs actions). Subplot characters are those who are attempting to influence the outcome of a secondary situation, which may have an impact on the campaign as a whole (example: young lovers who do not realize that their romance could be politically explosive and thus hazardous to the PCs).

In order to track these major named characters, a simple file card system will suffice. For each major named character, take a 3×5 file card and on one side describe the physical appearance, weapons, experience level, and mental characteristics of the NPC. On the reverse, briefly note the current location, status, a few brief historical notes on the NPC, and a word or two about his planned actions. This card is then placed into a file of active NPCs which is updated approximately once every game day. Usually, an update need be nothing more than a simple note as to the current situation of the NPC.

If any card should get too cluttered with updates, discard the card and make a new one. If an NPC is killed, file the card in an inactive file and mark it KIA, with a short note on the circumstances of the death. If the NPC can no longer influence the situation of the players, then the card should also be placed in an inactive file. The inactive file should be updated at least once every game month. Usually, NPCs here will remain very much the same, but this updating is an opportunity for the referee to develop his own world a bit more. Some inactive NPCs will die while others may be forced to move on, and

In order to track these major named characters, a simple file card system will suffice. For each major named character, take a 3×5 file card and on one side describe the physical appearance, weapons, experience level, and mental characteristics of the NPC. On the reverse, briefly note the current location, status, a few brief historical notes on the NPC, and a word or two about his planned actions. This card is then placed into a file of active NPCs which is updated approximately once every game day. Usually, an update need be nothing more than a simple note as to the current situation of the NPC.

others may yet begin new projects.

The reason for this monthly updating is that if PCs ever happen to return to an area, the referee will simply be able to flip through the inactive file and quickly determine what that area is now like.

CONCLUSION

It is best to remember that NPCs deserve all the care in crafting that is possible. If a referee spends the time to define an NPC in detail, he will find that the NPC has become real. This extra care will make the NPC real to the players, and that can only serve to make the game more entertaining than ever before.

—Roman J. Andron

THE GREAT PATRIOTIC WAR

In June the German Army launched what was to be a 10- to 12-week campaign designed to crush the Soviet Union, and ushered in the largest land campaign ever fought in the history of warfare. The Soviet State was staggered, but victory eluded the Germans. From the brink of disaster the Red Army fought its way back to first stop the Germans and then to slowly turn the tide. By April 1945, the Red Army had surrounded Berlin, and the German Army had been destroyed.

The Great Patriotic War is a simulation of this great struggle. The rules have been streamlined to allow players to concentrate on the playing of the game rather than the reading of rules, but this streamlining did not mean neglecting the intricacies and details of this colossal struggle. Leaders, airborne assaults, Tank Armies, Shock Armies, and air support all play their parts in the ebb and flow of the war.

The Great Patriotic War has more than 200 counters representing the Red Army, the German Army, and their allies. The large, colorful, two-piece map depicts the area from Astrakhan to Berlin, with all the relevant and problematic terrain noted. A separate scenario booklet for each army details five different scenarios. **The Great Patriotic War** gives you the chance to be involved in one of the most important military campaigns ever fought.

GDW

Cloudship Design

Sky Galleons of Mars is set in an interesting period of European colonial expansion on Mars. The scenarios and campaign game cover the period shortly before and during the Oenotrian War between Britain and the Oenotrian Empire. The British have now been building their armored steam-powered aerial gunboats for less than a decade, and the true modern screw galley has only been in existence for about twice as long. As such, everyone is still exploring the potentials and capabilities of their vessels and searching for "best" designs. It is entirely appropriate for players to join in this search with gusto. In fact, much of the enjoyment of the game comes from matching your own designs against those of an opponent. This article is meant to provide you with tips on what to try and what to avoid when putting together a (hopefully) successful design.

DESIGN PURPOSE

The first thing you need to do is identify what purpose the design is to serve. This sounds trivial and obvious, but it is the area where designs most frequently fail. Clearly define the purpose of the design in your own mind before you actually begin choosing components. If you do so, you will be better equipped to avoid the first pitfall of design, *over-specialization*.

In one of our many playtest sessions, a player showed up with a fairly small British gunboat positively bristling with Nordenfelts and 1-pounders. It was fairly cheap, reasonably speedy, could reach Very High altitude, and chewed up Martian screw galleys at an impressive rate. "Ah ha!" several players exclaimed, "It's the perfect ship!" Of course, when the *Hamburg* showed up on the Martian side, it suddenly didn't look so impressive, but there was only one *Hamburg* on Mars, and so the British player
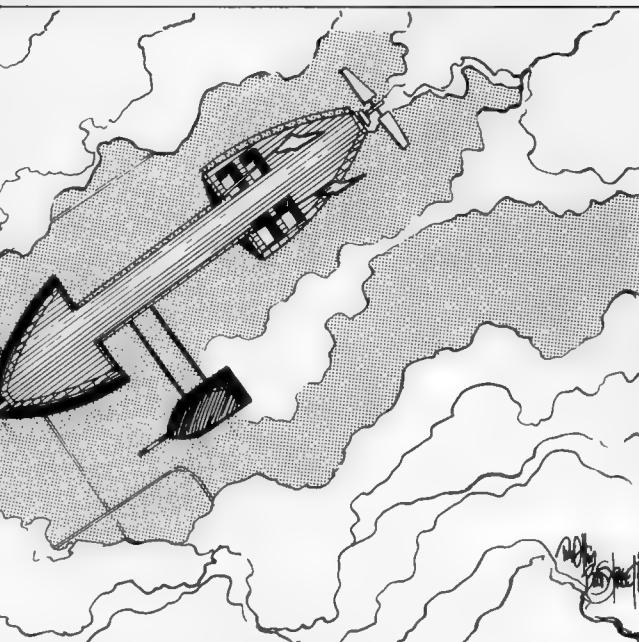
argued that this shouldn't detract from the fact that he still had a superior pirate-killer. The truth is, though, that an off-the-shelf *Whisperdeath* kite will do the same thing to this lightly armed patrol boat.

The nature of ship design is such that a vessel will, over the course of its service life, be called upon to carry out a variety of missions against a variety of enemy forces, and it is usually impossible to determine in advance what type of opposition you will be running up against. If your vessels become specialized to deal with one type of enemy craft, the odds are that they will find themselves helpless (as in the example above) when confronted by another. Within limits, a ship should be able to do a little bit of everything. Otherwise it will inevitably run into an adversary against which it is completely helpless.

SPECIALTY SHIPS

Now, having given ample warning against the dangers of over-specialization, let me also admit that there is considerable fun to be had designing specialist ships. If these ships are to form part of a larger squadron, which is more often the case with Martian than European vessels, it actually makes considerable sense to have one or two. Two examples of specialized Martian ships come quickly to mind: the *Fire Bomber* and the *Boarding Ram*.

The Fire Bomber: Start with a moderately sized hull, say a four or five, and then pile enough turn-cranks on to get its speed up to 6. For armament, put on about six liquid fire racks, and fill out its weight with marines. Make sure it's light enough to reach Very High altitude, however, as it won't be much of a bomber if it can't get above its target. The *Fire Bomber* is one of those ships that has to hang back until the enemy vessels have been forced, either by the tactical situation or battle damage, to a lower altitude. Its great speed then enables it to dash in and dump a big load of liquid fire on a target, enough to cripple or destroy all but the largest of ships. Afterward it has the speed to ram or grapple the enemy and be very annoying with its marines.

The Boarding Ram: This ship is very similar to the *Fire Bomber*, except that it doesn't need the fire racks, but instead requires a ram. Its speed gives it an excellent shot at ramming British vessels, and its altitude means no one is secure. Loading it up with marines gives it a good chance just to overwhelm a vessel in the first turn or two after boarding it. However, the large number of turn-cranks virtually guarantees that you will win a protracted fight. If there is a recipe for dealing with big, mean British ships, this is it.

THE MANY VERSUS THE FEW

In a limited budget game, whether the budget is tonnage-based or money-based, the real tough question is whether a few big ships are better than a lot of little ships. There is no single right answer to the question, as both alternatives have advantages and disadvantages; the correct choice is probably based as much upon the situation you anticipate facing as it is by any sort of universal utility.

So, what are the advantages and disadvantages? The potential disadvantage of a single large ship versus many smaller ones is well illustrated by an experience I had during one of the playtest games. We had a fairly large force of Martians against a small squadron of light British gunboats, and the British were getting beaten up pretty badly. To balance things out, I took a *Reliant*-class ship and waded in. As I approached the battle, one Martian *Hullcutter*-class ship zipped out of the melee and popped off a round from its lob gun, which hit. I missed my recovery roll from the loss of trim and plummeted to Medium altitude, missed it again and plummeted to Low, missed it again and plummeted to Very Low, and then missed it again and crashed. So much for the *Reliant*.

What this illustrates is the potential danger of placing all of your eggs in one basket. The advantages of several small ships versus a single large one is that your total force is less vulnerable to Critical hits. A Trim Critical, for example, will immobilize a ship for a full turn, regardless of its size. If you have three 300-ton ships, a Trim Critical on one of them immobilizes a third of your force; if you have one 900-ton ship it immobilizes your entire force.

So what are the advantages of a big ship? While a big ship is just as vulnerable to a Critical hit as is a small one, it is considerably less vulnerable to conventional damage. A small ship, on the other hand, has a good chance of having its utility severely curtailed by a single hit from a good gun. Take the *Aphid*-class as an example. One good hull hit (causing two points of damage) will knock one full altitude level off of its ceiling. A single gun hit can knock out its only heavy gun. It can only absorb two or three crew hits (depending on whether or not you feel like you need a signalman) before crew casualties begin reducing its firepower or speed. This is a very fragile ship! Bigger ships, on the other hand, can usually take considerable doses of conventional damage before suffering any significant reduction in their capabilities, and that ability to take it as well as dish it out adds considerably to your tactical flexibility.

When choosing armament for your ships, you face pretty much the same sort of choice between a few big guns or a lot of little ones. The advantages of many little guns are that you have that many more chances to achieve Critical hits. Even though a Trim Critical is very easy to recover from when caused by a gun with a damage value of 1, it still immobilizes the ship for a full turn. Likewise a magazine hit is a magazine hit, and it doesn't matter at all how big the shell was that caused it. A second important advantage of many smaller guns is redundancy. One big gun can be taken out by a single gun hit from any but the puniest of guns, while it is difficult to suppress multiple gun mounts spread out along the length of the ship.

On the other hand, the advantages of big guns are that there are things they can do, such as penetrate armor and hit from extremely long ranges, that smaller guns normally cannot. Also, when they do hit the results can be really spectacular. A Trim Critical from a small gun usually results in a turn's worth of inactivity, while a Trim Critical caused by a 6-inch gun is usually fatal. Likewise, fires, bridge hits, jammed rudders and the like caused by small guns are more of an annoyance than a threat, while the opposite is true from big guns. A good design will usually be built around one or more large guns supported by "secondaries," as this provides most of the advantages of both without falling into the trap of over-specialization.

VARIANTS

It may seem a bit early to suggest variants to the ship design rules, but these are mostly minor variants which do no violence to the basic design system, and meet requests that have been advanced by a number of players.

CONSTRUCTION TIME

If you are playing an on-going campaign and want a new ship built, how long does it take? Multiply the hull size by two, the result being the number of weeks that it takes to complete the ship.

MIXING COMPONENTS

Everyone wants to mix components from different shipyards, and demands to know why they cannot. Well, the reason is that Europeans will not normally sell high-tech equipment to Martians and in turn do not have access to the plentiful supplies of liftwood that Martian shipyards do. The British have access to the Martian yards at Parhoon which has thus-far been able to obtain adequate supplies of liftwood at reasonable prices. However, shipyards are neither wholesalers nor outlet stores. The fact that a shipyard at Syrtis Major can place a 1-pounder Hotchkiss gun on a vessel it is constructing for £160 does not mean that it will sell you that gun in a crate for the same amount. If you think otherwise, try going to your local Chevy dealer and buying just the engine for your car, and then take it to a Toyota dealer and ask him to put it in a Corolla for you.
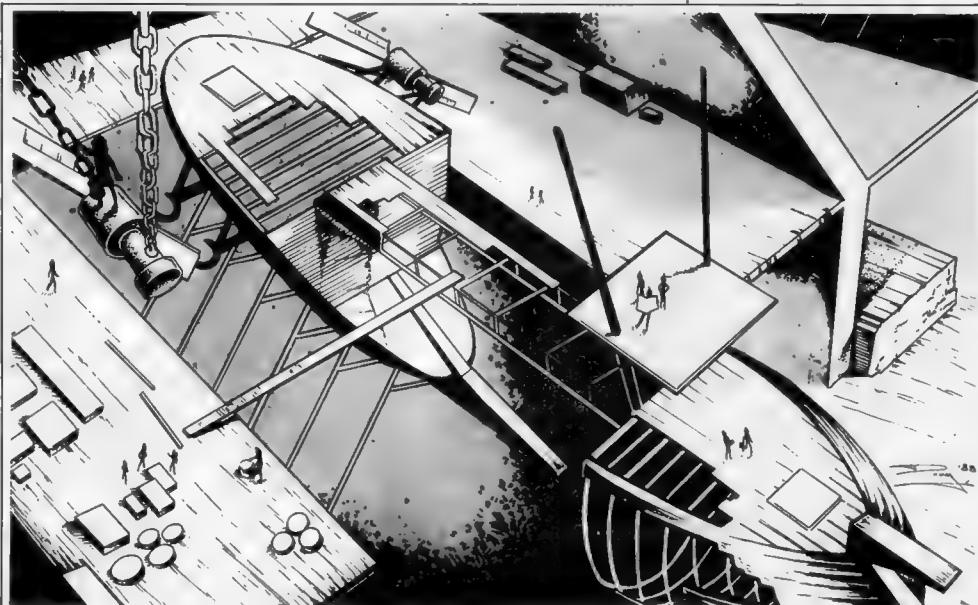
However, since some switching of components will be done, use the following rule: The ship you design must be built in either a Martian or a European shipyard, and that yard determines the type of hull that can be built and its price. All components added to the hull that are not normally available to that shipyard cost twice their normal price. Smutts Dischargers may only be installed in steam ships.

DORSAL GUN MOUNTS

A dorsal gun mount is suspended from the keel of the ship. A ship may have dorsal gun mounts which fire into the same firing aspects as normal gun mounts or may have a single dorsal gun mount which fire into all firing aspects. Dorsal gun mounts are subject to the same limitations on fire as a normal gun mount. They may never fire at targets at a higher altitude and may only fire at targets at the same altitude at close range.

The gun costs and weighs 20 percent more than normal. If armored, it must be armored as a rotating mount and adds 10 percent to its normal gun weight for each armor level installed.

DEADFALL BOMBS

Deadfall bombs are carried in racks and dropped on land targets below the vessel. They are dropped during movement in the same manner as Martian liquid fire; roll one die per rack and subtract the difference in altitude between the ship and its target, the result being the number of bomb hits scored. Each bomb hit has a penetration of 1 and a damage value of 2. Bombs may only be dropped on large ground targets.

Each rack of deadfall bombs has no significant weight but costs £50. No more than one rack may be installed per hull size. Each load weighs five tons and costs £10. A ship may carry more loads of bombs than bomb racks, and four deckhands may reload empty racks from extra loads carried in five turns. (Add one turn to the reload time for each missing crewman.)

ADDITIONAL VARIANTS

The design system is clean and streamlined, and I think that it's important to keep it that way. However, a few variants never hurt, so feel free to add your own quirks to the system. The one note of caution I offer is to avoid piling so many or so profound variants onto the system that it isn't the same game any more. If you look at the variants presented here, none of them make existing ships worthless or change the basic nature of ship construction; they just add one or two handy items to the existing game. Likewise, adding a light-weight quick-firing 6-inch gun to the ordnance list would clearly violate the spirit of things.

CONCLUSION

One of the real joys of games like **Sky Galleons of Mars** is in building your own ships and matching them against the designs that other people turn in. I hope that the few hints we've discussed will help you avoid some of the bigger pitfalls in the system, and that the variants add a little more spice to the game for you.

—Frank Chadwick

Ironclads and Ether Flyers

Now that **Sky Galleons of Mars** (**SGOM** for short) has been out for several months, a number of people have been asking about the second game, **Ironclads And Ether Flyers** (**IAEF**). What I'd like to do here is tell you a little bit about the game and how I designed the system which both of these games use.

Having said that, I suppose I've answered the most common question, "Are the two games compatible?" Yes. Both games use exactly the same ground scale, time scale, and game system. Gunboats and cloud ships from **SGOM** are usable in **IAEF** and vice versa. If you'd like, you can play with an ironclad gunboat on the canals of Mars being attacked by Martian screw galleys and kites, as easily as you can use a *Reliant*-class gunboat to attack the Imperial German ironclad battleship *Thuringen*.

The thing that made it very easy to make the two games compatible was that the original research for **SGOM** consisted mostly of research into actual naval vessels of the last quarter of the 19th century, and all of the equipment, particularly weapons, that are used on the aerial gunboats in that game are based upon the actual ordnance available. Since aerial gunboats are all fairly recent in construction, only the most modern weapons were covered, and **IAEF** will add the older muzzle-loading rifled guns

that some of the older naval vessels still mounted. But the basic range of modern naval guns presented in **SGOM** is grounded in the actual guns in use.

The other major component in ship design was also taken from the actual technology of the day: steam engines. The basic means of power in warships at that time was the coal-fired steam engine, as presented in **SGOM**. Railroads were also enjoying their heyday, and locomotives were powered by a more compact and powerful version of the conventional steam boiler, called the *forced draught boiler*, which enjoyed roughly the same fuel efficiency as conventional boilers, but was more compact. In the mid-1880s the Thornycroft shipyards began building high-speed torpedo boats which used what were essentially railroad locomotive boilers for power plants, and achieved impressive horsepower-to-weight ratios. By 1888, Thornycroft forced draught boilers were achieving one horsepower for every 58 pounds of weight of machinery, boilers, and water in the boilers, while earlier conventional boilers required as much as 480 pounds per horsepower. Most naval boilers were more efficient than this, and the efficiency advantage of forced draught declined as the boiler size increased above that used for locomotives. Nevertheless, most naval

vessels being built by the end of the decade were incorporating some means of forced draught and were almost universally achieving one horsepower for every 100 to 200 pounds of boilers and machinery, an amazing improvement over vessels built 10 years earlier.

Not all of this improvement was due to the adoption of forced draught boilers, as engine technology improved greatly in this period as well. From the early 1870s to 1881 there had been little change in the character of marine engines, virtually all of which were compound two-cylinder vertical engines; but by 1887 almost all new construction used the triple expansion engine. This new engine design doubled the mean working pressure of the engine (from about 75 pounds to about 150 pounds) and achieved some fuel efficiencies as well.

Because **SGOM** deals exclusively with small engines, we have adopted a constant efficiency for machinery, regardless of size, and given builders the option of forced draught or conventional boilers; all engines are assumed to be of the modern triple expansion variety. **IAEF** will elaborate on this a little, particularly when it comes to larger boilers, but will retain the same basic simplicity of the design system.

A change of greater impact in the long run, although it had little effect on naval
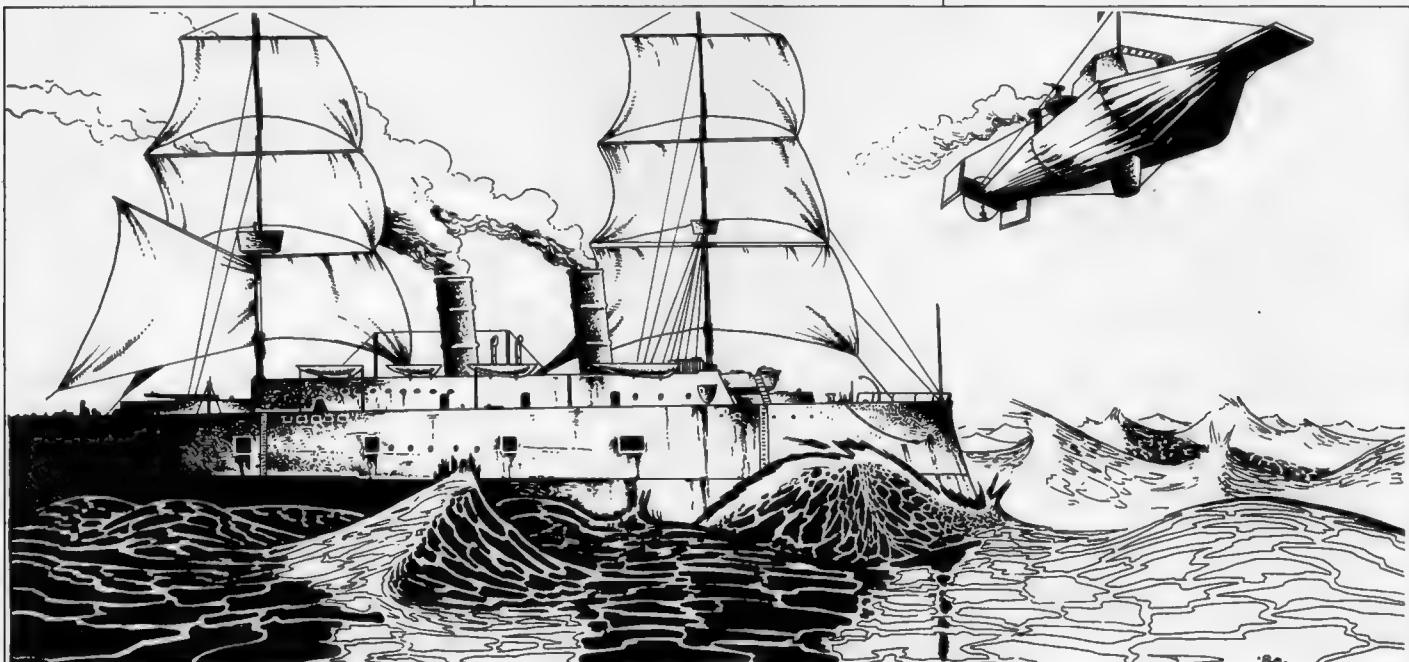
design at the time, was the adoption of "petroleum refuse" as a fuel in place of coal. Petroleum refuse was the waste by-product of crude oil after the paraffin and kerosene had been extracted, and it was coming into widespread use in areas where there were active oilfields. A Mr. Urquhart, writing in *Engineering* on June 25, 1886, described the Grazi-Tsaritsur Railway in Southern Russia: "There are now 143 locomotives running on petroleum on this line, in fact no other fuel is used for locomotive purposes, while 25 stationary boilers are fitted with the same arrangement, and give excellent results."

The enthusiasm for petroleum is easy to understand; it has an energy value about one-third greater than coal per weight, and thus use of petroleum either increases range or decreases fuel weight to accomplish the same task. The disadvantages from a military perspective were its very limited availability; you can't really have a world-wide naval commitment serviced by ships whose fuel is available only in a few places. Likewise, this type of engine is not covered at all in **SGOM**, since there is are no significant petroleum deposits left on Mars (although there is still coal). We will include rules for petroleum-fired boilers in **IAEF**, however.

While the actual technological achievements of this decade were impressive, much of the interest in **Space: 1889** comes from the interaction of steam-age technology with space-age travel. In the **Space: 1889** universe, the most dramatic influence on naval architecture in the 1880s was the increasing appearance of aerial gunboats. As liftwood was still quite rare, there were never enough aerial vessels available to completely supplant nautical warships, but their presence exerted a profound influence on warship design.

One transitory design feature in the actual 1880s which will never catch hold in the **Space: 1889** universe is the barbette gun. Barbette guns were mounted in large open-topped armored barbettes which provided cover for the crew from small arms fire and some protection against flat-trajectory fire. There was no protection from overhead fire, but long-range gunnery was so difficult anyway that there was little danger from being hit by this sort of plunging fire. Furthermore, the weight savings over an armored turret were considerable. However, with the appearance of aerial gunboats, and their ability to deliver fire from overhead fairly easily, the barbette gun was abandoned before it ever really caught on.

A second departure from actual designs of the era is the mounting of high-angle guns, usually rapid fire guns of the Hotchkiss variety, but sometimes guns as large as 4-inch caliber. Many of these guns were historically adopted for close defense against small, agile torpedo boats, but proved equally effective as the earliest anti-aircraft weapons. Just coming into use at this time (but not yet available at the Martian shipyards, and hence not included in **SGOM**) is the Maxim-Nordenfelt 1-Pounder Pom Pom, a considerable improvement over the Hotchkiss gun of the same caliber. Statistics for this weapon will be included in the combat charts and
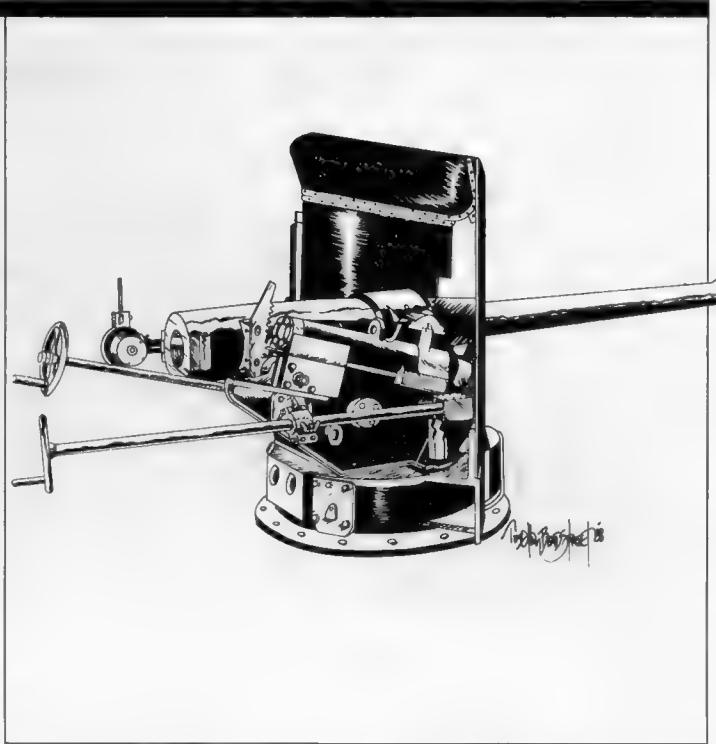
the design sequence for **IAEF**, and I'm sure that most local groups will adopt a house variant allowing their local Red Captains to send off for a mail order version, suitable for mounting in their own ships.

So far I've talked mostly about the differences in the design system, but I think that it's reasonable to close this article with a brief comment about the thing that provides the greatest difference between **IAEF** and **SGOM**: Naval vessels are BIG! Consider, for example, the HMS *Edinburgh*, a turreted battleship launched in 1886, which by the time of the game was neither the largest nor the most modern ship in the Royal Navy. Its displacement was more than 9000 tons. It mounted four 12-inch rifled breech-loading guns in its main turrets, five 6-inch rifled breech-loaders as secondaries, seven Hotchkiss guns, and 15 Nordenfelts. And its machinery, which alone cost more than £85,000, developed 7520 horse power and enabled it to make slightly more than 15 knots. The *Edinburgh* had more than 20 inches of armor plate on its most heavily protected sections. As for the total *Edinburgh* price tag: The cost is more than £640,000.

Try taking it on with the *Hamburg*!

—Frank Chadwick

The Canals of Mars

AQUIFIED REGION EXTENDS 5-50 MI.
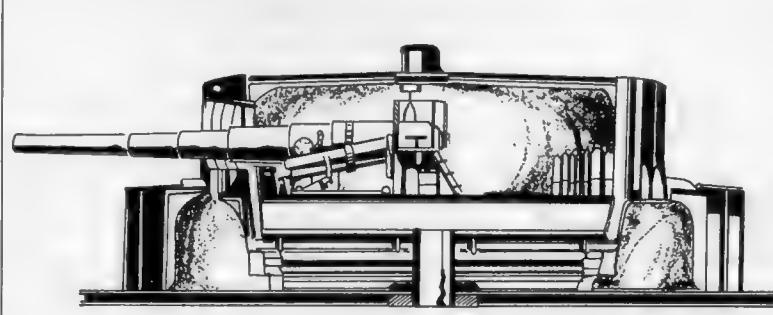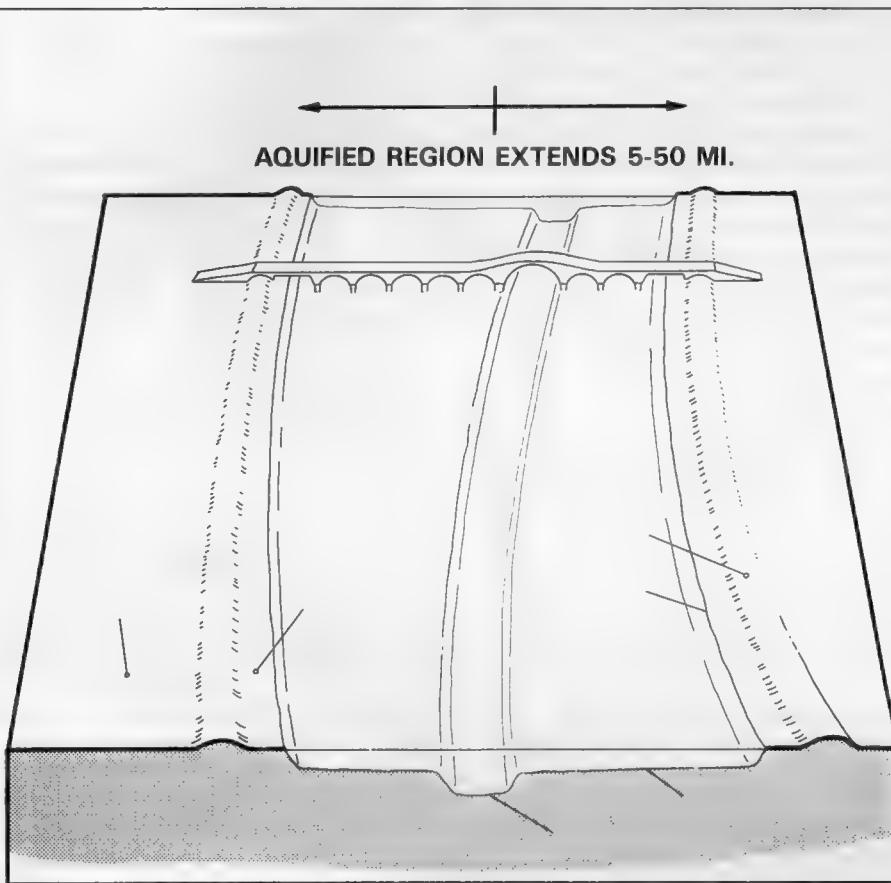
MARTIAN CANAL NOMENCLATURE

The most obvious characteristic of Mars is its network of canals. Seen from space, even from Earth, the canals draw a gridwork of lines on the face of the red planet. Their function is essential to the survival of civilization on Mars.

The Martian Water Cycle: Mars is a dry planet. Its seas dried up millions of years ago, and nearly all of its water is locked up in the iron oxides of its rust-red deserts. What little water that remains is frozen into the glistening white icecaps at its poles.

On Earth, water in the oceans evaporates in the heat of the sun, rises as water vapor into the air, and moves over the land. Eventually, changes in humidity and temperature force the water vapor to condense and fall as rain or snow. When it hits the land surface, some soaks into the ground, while the rest runs off into streams, creeks, and rivers, eventually making its way back to the oceans.

On Mars there are no seas, and the water cycle is reversed. Water is frozen into the Martian icecaps. In Martian summer, the icecap melts and the liquid water runs off to flood lakebeds or to fill the long Martian canals. Some of the water flows great distances in these canals, but virtually all of it eventually soaks into the ground to support agriculture. Eventually, it evaporates into the atmosphere as water vapor, and wind currents carry it around Mars. Only near the poles, however, is humidity high enough and the temperature low enough for the water to fall as rain or (more usually) snow. When the rain or snow does fall, it becomes trapped in the icecap until the next summer thaw.

The water cycle controls life on Mars. A desert is defined as a place where annual rainfall is less than five inches. Under this definition, virtually everywhere on Mars, except the icecaps, is a desert. Life is adapted to a desert en-

vironment and to sparse inhabitation levels. The canals are the Martian solution to unending desert.

When Martian civilization arose some 35,000 years ago, a temporary climatic spasm had melted large parts of the icecaps and flooded ancient, long-dry seabeds. On the shores of those newly refilled seas the great civilizations rose and flourished. Ten thousand years later, as the climate again shifted and the seas started to recede, the Martian civilizations struggled to reverse the flow. When that failed, they dedicated their energies to building canals which would carry the melted icecap waters to all parts of their globe. It is these canals which today mark the surface of Mars.

TYPES OF CANALS

Three types of canals are encountered on Mars: the Grand Canals, the Petty Canals, and the Dead Canals. Each has its own role in the master scheme of canals and irrigation on Mars.

Grand Canals: The major Martian canals are the Grand (from the French: big) Canals. The typical Grand Canal is aproximately a mile wide and 100 feet deep. In cities, the banks themselves are paved promenades serving as plazas, markets, and bazaars; in the countryside, massive earthen levees help to contain flooding when the first rush of flood-waters comes in summer.

Water seeping through the bottom and sides of the Grand Canal creates an underground water table (an aquifer) which supports agriculture, forests, and animal life for miles on each side of the Grand Canal. In the ancient (and now dry) Martian seabeds, this aquifer may reach as far as 50 miles on each side of the canal; in the Martian landforms (what were once the dry land continents), the aquifer reaches less than five miles out on each side. The flourishing strips of land which are located on each side of the canal (whether in ancient, dry seabed or ancient continent) are called the Banks: They contain the croplands, the orchards, and the pastures of Mars. All Martian agriculture is dependent upon these Banks.

Petty Canals: Branching off the Grand Canals are the Petty (from the French: petit, meaning small) Canals. These small

watercourses lead off from the Grand Canals and extend to the limits of the Grand Canal aquifer. They serve two purposes: irrigation and transportation.

Petty Canals carry water to the edges of the Grand Canal aquifer and help to drain excess ground water back into the Grand Canal. Their primary purpose, however, is transportation: Barges venture off the Grand Canals to small farming communities to provide passenger, cargo, and mail service.

Dead Canals: Once upon a time, all of the canals were vital, essential parts of the globe-encircling Martian canal network. Over time, however, some of the canals have fallen into disuse or disrepair; eventually they have died. These Dead Canals have been filled with blowing desert sand and have become unnavigable.

Dead Canals, even though they are no longer passable for ships and barges, remain channels for water flow. Beneath the sand-filled surface, water still runs in deep channels and still creates an aquifer which (when compared to the desert around it) supports green plants and some animal life.

The Dead Canals are the highways of the Martian deserts. No longer carrying open water, their underground channels still support surface vegetation, and occasionally provide a well or spring with cool, fresh water.

NOMENCLATURE

In order to better understand the function and construction of the canals, it is important to know the terms used in describing them. A canal consists of a channel which lies between two banks. Along the bottom of the channel is a deeper section called the low flow channel which carries boats, even when the canal is nearly dry. Beyond each bank and paralleling it is a long mound of gravel and soil called the levee. The stretch of land between the canal bank and the levee is the promenade which functions as a road and a shore. Beyond the levee, the aquified swath stretches from five to 50 miles to each side of the canal.

The typical canal components are shown in the accompanying diagram.

CANAL CONSTRUCTION

The ancient Martians built with strength and cleverness. They intended their handiwork to last for millennia, and it has.

[†]Sir Basil Throckmorton of the Royal Society has calculated that a single double-turreted ironclad ship, suspended by liftwood floaters, could blast one mile of channel (one square mile of a hole 30 feet deep) only by firing 250,000 one-ton projectiles at the rate of one per minute over the course of half a year. Since such an effort would take a fleet of a thousand such ships a thousand years to blast the 60,000 miles of Martian Grand Canals, and the industry required to produce the projectiles would outshine all of Earth's industrial might, the project was clearly impossible.

Professor John Smyth of Oxford has pointed out that "impossible" is clearly not the word since the canals do indeed exist.

Canal Channels: The ancient Martians were masters of technology. They harnessed forces that defy the imagination to blast or burn the mile-wide Grand Canals through the deserts and the dry seabeds of Mars.[†]

The Grand Canals are broad, straight channels built primarily to carry water from the poles to other regions of Mars. Since they also support water transportation, it is reasonable that they are also adapted to the many boats which travel their length.

Each Grand Canal has three possible water levels: Flood, Flow, and Low Flow; the names correspond to the Martian seasons of the same (translated) names.

● Flood is the short season in which polar meltwater rushes down the canal. It begins with the first swell of meltwater and lasts until the water level has again receded below the level of the canal promenades. Flood marks the beginning of the growing season, and is roughly equivalent to spring.

Flood fills the dry canals with meltwater from the polar icecaps. Especially in regions closer to the poles, this rush of water severely overburdens the capacity of the canal, often reaching to the tops of the levees and overflowing to the croplands beyond.

● Flow is the long typical season on Mars. Water fills the Grand Canals to within a few feet of each Bank. Navigation is easy and unimpeded; the locks connecting the Petty Canals to the Grand Canals are left open. Flow continues through most of the year and is equivalent to summer and fall.

Flow is the normal water level. Water reaches within two or three feet of each Bank.

● Low Flow is the dry season on Mars. The icecap providing meltwater has almost completely melted and can provide no more water for the canals. The Low Flow Channel in the Grand Canal remains wet, but in some areas or at some times may be completely dry.

Low Flow is the typical water level in the dry season (late winter just before the spring icecap melt); water in the Grand

THE MARTIAN WATER CYCLE
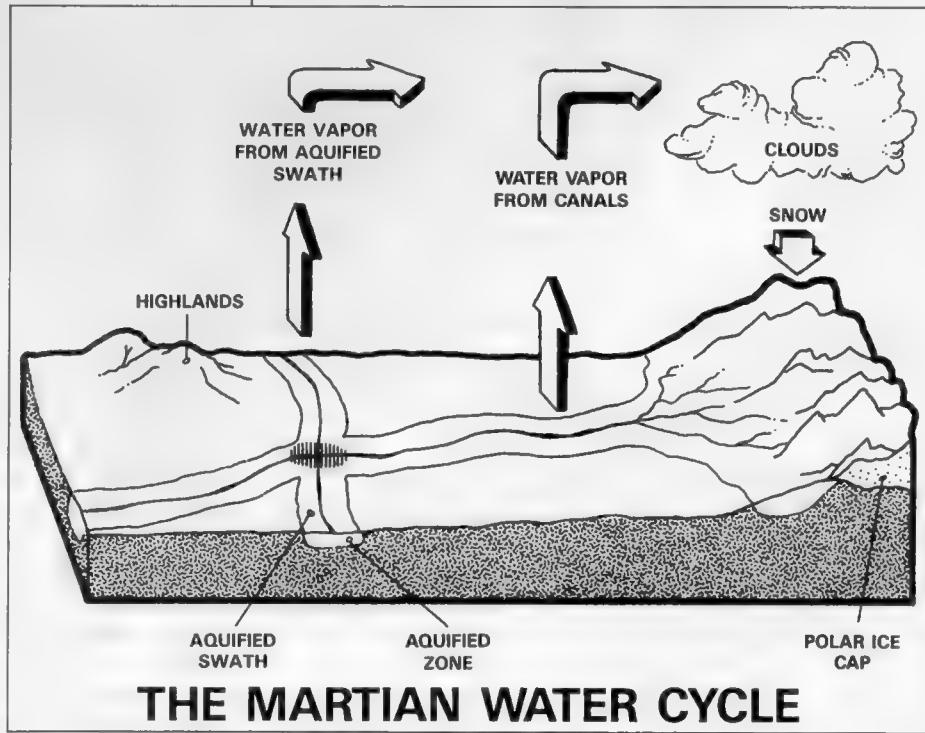
CROSSOVERS
(Arrows indicate direction of flow)

- BRIDGING

BRIDGE

CONNECTING
CANAL

LOCKS

FALLS

- OVER/UNDER

EMERGENCE
POINT

CONNECTING
CANALS

SUBTERRANEAN
FLOW

SUBMERGENCE
POINT

- MEETING

DIVERTER
STRUCTURE

RWC
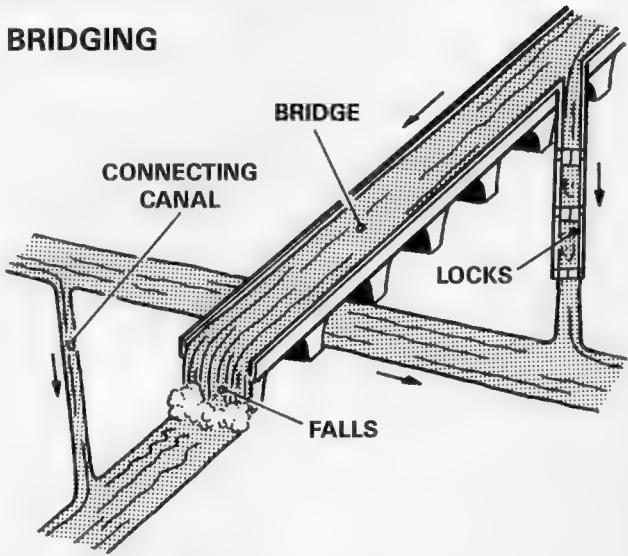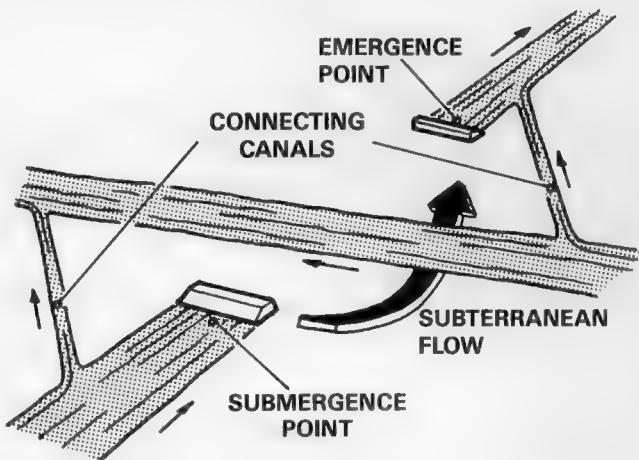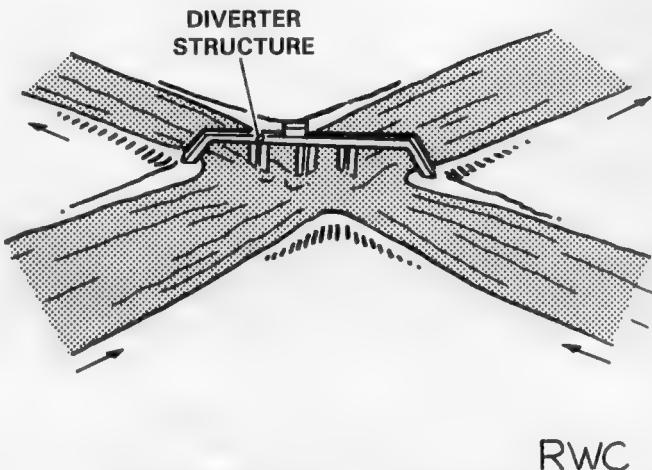
Canal is reduced to a mere trickle. Cut into the bottom of the Grand Canal is a Low Flow channel measuring perhaps 50 to 100 yards wide and 30 feet deep, clearly sufficient for almost any canal boat or barge. The Low Flow channel snakes its way along the bottom of the Grand Canal, first touching one bank, then angling over to touch the opposite bank some two or three miles downstream. This wandering of the Low Flow channel actually serves a useful purpose, reducing the distance merchants must move their goods across the dry canal bottom before they can reach a bank.

• Surge is a uniquely Martian season which takes place at some time during Low Flow. As the Low Flow season progresses in one Martian hemisphere, the Flood and Flow seasons are taking place in the opposite hemisphere. Some of the water flow from the opposite hemisphere makes its way, eventually, to some of the canals on the other side of the world. The surge of water that makes its way to the other hemisphere, where it does, produces a temporary replenishment of water in the canal beds.

Banks: The banks of the canals slope steeply up from the bottom, usually at an angle of 70 degrees or more. Cut into these steep banks, however, is a constant series of accesses. Staircases allow an easy descent to the current water level, or to the dry canal bottom when only the Low Flow channel is full. Docks (usually paired with the staircases) let boats pull in, out of the current. Broad, shallow-sloped ramps cut through the banks to allow the launching and beaching of barges.

Promenades: The flat edges of the canals are called promenades; in rural areas, the promenade is nothing more than a flat sandy edge to the canal. In cities and settled areas, some promenades serve as markets (holding permanent shops and storefronts) or bazaars (for temporary merchant sites). Other promenades are broad plazas or parks adding to the beauty of the Grand Canals as they pass through the city-state.

Levees: Rising above the banks of the Grand Canals are broad levees intended to contain the floodwaters of Martian spring. In the countryside, these levees are little more than mounds of gravel and clay. In Martian city-states, they are more solidly and carefully built. In their shadow, the banks of the canals become promenades used for markets, bazaars, and gatherings. On and behind the levees, the city-state's buildings rise in splendor.

Crossings: Innumerable bridges cross the canals of Mars. A few basic bridging principles are used to produce a great many different bridges that cross the broad Grand Canals. Almost all consist of a long causeway from each bank, meeting in a span that crosses the canal at the Low Flow channel. In order to accommodate barge superstructures and masts, the bridge either arches high enough to produce a 40-foot clearance above the normal flow waterline, or is constructed on a drawbridge or turnstile system.

Straits: Although the typical canal is about a mile across, there are places where this width must be reduced to 500, 300, or even 100 yards. The canal builders, in order to maintain the same water flow, were forced to dig the channels deeper at these points. These straits are often encountered as a canal passes through a rock escarpment, through a city, or when two canals draw close together.

The city-state of Oenotria (in southwestern Syrtis Major) is located at the junction of six Grand Canals. For most of the

year, the placid waters of the narrow canals give no clue to their depth. In winter and early spring, however, as their flow dries up, the city is transformed into a series of islands separated by canyons some 70 to 90 yards deep...the dry channels of the Grand Canals.

Locks: Locks help to contain the water at proper levels in the canals in spite of steep grades and slopes. Locks are placed at strategic locations along the Grand Canals and at the points where Petty Canals touch the Grand Canals.

The lock connections between the Grand and Petty Canals are especially important to transportation on Mars. The water level in a Grand Canal varies with the season. At the lowest Grand Canal water level, a Petty Canal would soon be drained of its water. The lock connection protects the water in the Petty Canal and still allows a barge or boat to return to the Grand Canal.

Cataracts: Water flow down over relatively great heights is, in many parts of the Martian canal network, left to gravity. The broad flow reaches an edge, and simply drops the necessary distance before resuming the course of the canal.

Originally, deliberate cataracts were constructed with large pools above and below the falls, and a reinforced lip for the cataract edge itself. Time and the force of tons of water has generally eroded the lip, forcing back the cataract edge in an uneven pattern. Debris below the falls makes the lower pool dangerously shallow and filled with treacherous rock fragments; erosion above the falls fills the upper pool with swift, shifting currents.

Keeping transportation in mind, the canal builders constructed bypasses around the cataracts. Small canals and a series of stepped locks were a common method of providing boat channels, but other popular methods included crane points and slipways.

Aqueducts: In some locations, one canal moves down the center of a valley while another canal must cross the valley at a right angle. In such situations, the canal builders produced massive aqueducts which bridged the valley and carried the canal across the gap while allowing the other canal to pass below.

Probably the most spectacular of Martian aqueducts is the Lycus Valley Aqueduct in Arcadia. The Dead Canal from Euxinus Lacus to Ascreaus Lacus flows through the Lycus Valley; at the same time, the Dead Canal from the icecap to Olympica crosses the valley at a right angle. To avoid creating an immense pumping station, and to avoid mingling the flows of the two canals, an immense aqueduct was built, stretching more than 40 miles, at times more than 1500 feet above the valley floor. The upper surface of the aqueduct is a dry channel more than 400 yards wide, once full of life-giving water, now only occasionally used as a caravan route through the desert Martian wastes.

Cascade Pools: When water flows down hill, it accelerates. The farther it flows, the faster its speed. There are sections of Martian canal where a long stretch of downhill slope would make the water flow unreasonably fast. In order to correct this, the slope is broken with a series of cascade pools: broad, flat pools that allow the water flow to be slowed to nothing before it enters the next section of sloped canal.

Crane Points: At certain points along the course of the canals, the designers found that boats and barges had to be transferred from one canal to another quickly and efficiently, and that for any number of reasons the normal system using locks would not work. In those situations, one of the options available was the crane rigged to physically lift the boat or barge out of one canal and into another.

The simplest crane system moves the boat in one swing. Cranes are often employed at cataracts to lift or lower the boats the several hundred feet required.

CASWELL 1988
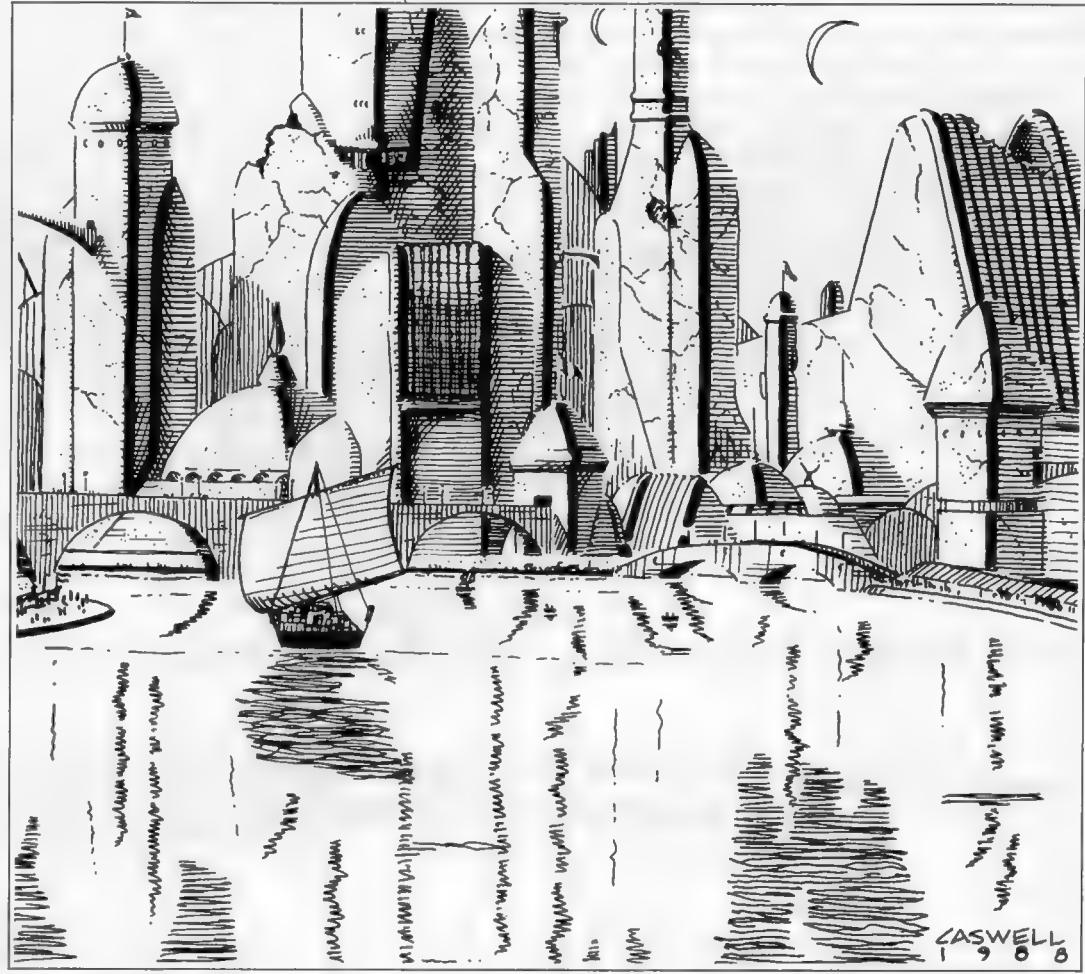
More complete crane systems employ several (as many as 10) cranes installed in a series; each in its turn lifts the boat and swings it closer to its destination. One such system in the Belgian Coprates shifts boats through eight pools cut into the sheer cliffs at the edge of the Ophir range. Each crane swings across a diameter of 220 yards and lifts a boat more than 500 feet. A boat travelling through this crane point travels more than a mile horizontally and about 4000 feet vertically.

Crossovers: When the flows of two canals meet, their waters may mingle or may be kept apart depending on which system best handles the needs for water. Crossovers allow most of the water in each canal to remain in that canal, while some surface water is exchanged in order to allow boats and barges to transfer from one canal to the other.

Slipways: Although water can drop vertically at a cataract, boats and barges need to move more gently. When the distance is not too great, gently sloped slipways are constructed to carry the vessels up or down.

Slipways may be either wet or dry. A dry slipway mounts the vessel on a roller chassis and drags it along a smooth stone-paved road from one point to another. A wet slipway allows a boat to float down a gently sloped channel, or to be pulled (by winches or beasts of burden) up the same channel.

Pumping Stations: Although the water of the canals generally flows under the force of gravity, there are many places where it must flow up and over mountain ranges or down into valleys and back out again. The canal builders constructed strategically placed pumping stations to force water up against the force of gravity. Many different methods were used, and some can still be seen along the banks of the Grand Canals.

One type of pumping station is powered by the volcanic heat which creates steam to drive water up a sheer rock shaft more than 2000 feet in height. Another uses massive carved stone water wheels at a branch in a canal; the majority of the canal water proceeds downhill, but its force is used to divert a fraction up and over a rock escarpment and out into a desert canal.

Other pumping stations are more difficult to fathom.

One simply draws water up a massive underground channel and spews it out in a fountain more than 10 miles away. Explorers have noted extreme magnetic disruptions in compasses in the region; animals in watertight barrels have safely traversed the length of the channel with no apparent ill effects. But no explanation is forthcoming for the mechanism that still moves massive amounts of water after 25,000 years of operation.

The Memnonia pumping station, now in disrepair, once forced masses of water up the Gorgonum Sinus and into the desert beyond. Under the collapsed roofs and beams of the station can still be seen the immense cylinders, pools, and rusting conduits that once carried water up the valley. Local legends say that the ruins are haunted by the ghosts of workers who died trying to keep the station operating even as parts continually broke and could not be replaced or repaired. When the station finally and permanently failed, it doomed the Grand Canal to Arsia Silva and Nodus Gordii to death and burial under the shifting sands of the desert.

The Aeolis pumping station, once filling canals that served Zephyria and Trivium Charontis, employed massive turbine pumps to force water up the mountain slopes. Their mysterious power source (which emits a deadly gas inside an immense chamber) has weakened over the millennia to the point that the turbines now turn only slowly, and without the force needed to move water up the long conduits leading over the mountains.

Other stations present equally mysterious mechanisms which no longer work: crumbled towers that once stood three miles in height; sealed tombs filled with corrosive liquids; pumps using long slender threads on mounts and pulleys; equipment that obviously used electric current, or magnetic current, or even etheric current, but in mysterious ways that cannot yet be understood.

Settling Pools: At regular intervals along every Grand Canal the banks of the main channel widen and the bottom deepens, creating a large settling pool. The bottom configuration is deliberately constructed to produce currents and eddies that will deposit debris, sand, and silt in the deeper areas where it will not obstruct the main channel.

Because the Low Flow season produces dry canal beds, the bottoms of the settling pools are exposed at least once every year. At these times, scavengers clear the dirt and debris from the pool floors as they search for salvage, precious metals that collect in the silt, and even food plants that grow in the lingering moisture of the soil. Conscientious city-states send out work-crews to clear the settling pools during Low Flow, aware that after several seasons of no maintenance, the settling pools will start to clog the main channel and eventually ruin the canal itself.

Cities: The cities of Mars are almost universally located on the canals. Canals provide trade and commerce, income, life-giving water, and political power.

The Seldon Bridge Over the Grand Canal in Syrtis Major
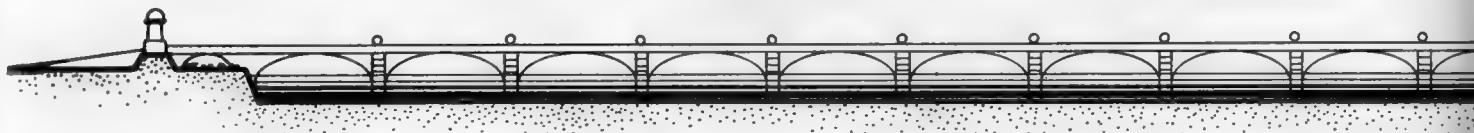
Water shown at flow level

Cities are classified by their relationship to canals. The number of canals that enter and leave a city provide a rough indication of its political and commercial power. A city with only two canal connections is obviously less important and less powerful than one at the junction of seven or eight canals.

Martian cities are more properly considered city-states. A city controls its own built-up area and the aquified banks of the canals leading to it. Its control ends at the edges of the aquified areas, and about halfway down the canal to the next city-state. A lot of battles have been fought over the centuries to establish just how far "halfway down the canal" really is.

Aberrations: Centuries of use, misuse, disuse, and abuse have taken their toll on the canals of Mars. When pumping stations broke down and could not be repaired, vast stretches of canal were doomed to a sandy death. In some areas, levee repairs were neglected; eventually, the canals spilled over their banks to create vast impassable swamps or broad marshes. When conflicts between city-states halted transportation and commerce down specific canals, maintenance and upkeep was also halted; channels silted up and banks crumbled down.

After thousands of years, many sections of the canal network no longer have the finish and quality they once had. Crumbled walls have been replaced with inferior brickwork. Levees have been washed away and never replaced. New bridges have been built, and their supports obstruct water flow in unpredictable ways. And sometimes the technology has simply not existed to replace or repair the 1000-year-old canals.[†]

[†]The French science-fiction writer Jules Verne visited several of the Martian canals in the spring of 1886 and has proposed his own version of how the canals were constructed.

"The grand canal blasters of the Martians best resembled a broad-beamed cargo ship suspended from a truss constructed of the Martian liftwood material. Strong cantilever girders above the hull suspend a large solar reflector which channels the rays of the sun into an orifice. That orifice, in turn, directs the solar light into an internal network of lenses and out the bottom of the hull, where it is directed toward the channel to be dug.

"The modified and intensified solar rays heat the Martian soil into a kind of lava, part of which then boils away, while the remainder forms a strong, foamed volcanic glass lining for the water course. As this lining cools, it fractures into a sponge-like material that allows some of the water to drain into the local water table.

"An examination of the Grand Canal through French Boreo Syrtis and of a section of the dry canal bed exposed by a winter sandstorm confirmed that the canal lining is a foamed volcanic glass. Decorative carvings in the lintels of the ruined temple at Cydonia picture just such an aerial vessel as I describe here as well."

STANDARD BOATS AND BARGES

Virtually all of the facilities of the Martian canals are built to handle boats and barges of certain standard sizes. Vessels which exceed the standard dimensions cannot pass through the lock, cannot be picked up by the cranes at crane points, and cannot pass beneath many bridges.

The maximum width for a canal boat is 55 feet; the maximum length is 220 feet. Maximum draft is theoretically 25 feet during Flow; in practice, most vessels are built with a flat-bottomed draft of 15 feet or less. When a vessel mounts masts (for sails), they must be collapsible since about one bridge in 10 is fixed and has a clearance of about 40 feet.

Martian canal vessels come in a variety of shapes and sizes. Typically, vessels are divided into boats (passenger carriers, utility and patrol craft) and barges (flat-bottomed freight carriers).

Boats: Boats serve a variety of functions on the Martian canals. Their configuration depends upon that specific function. Boats have some form of propulsion. Merchant ships have sails because they are cheap and easy to use; military ships may have oars and rowers, or they may use some contrivance to transfer oarsmen's efforts to paddlewheels or underwater screws. Private ships often depend on a combination of sail and muscle power for propulsion.

Steam power is relatively rare: The expense of coal or wood is simply too great to be able to justify installation in watercraft.

Barges: A barge is a flat-bottomed freight boat. Built without a propulsion system other than a sail rig, barges carry cargos up and down the canals. Where possible, barges are simply left to drift with the current; where necessary the sail rig is raised to move against a current or to shift position within the main channel. On the Petty Canals, as well as on some stretches of the Grand Canals, barges are towed by beasts of burden.

THE HANDIWORK OF THE CANAL BUILDERS

The canals of Mars are the greatest civil engineering project ever undertaken. No construction on Earth can even rival the canals' grandeur; no Earth construction project is visible from space the way the Martian canal network is. It is a testimony to the survival instinct of the Martians that they could undertake and complete their canal network; without it, Mars would today be a dead planet.

—*Marc W. Miller*

Scale in yards

0   50   100

The Ether

Ether is the substance that fills all space, including the volume also filled by ordinary matter. Ether is the medium through which a variety of forces are transmitted through space.

A vacuum insulates against heat or cold because there is no way for them to jump across the intervening space. Light and gravity can be felt despite the presence of a vacuum precisely because the Ether is present (and can transmit those energies even in a vacuum).

Without the Ether, gravity would be unable to maintain the mutual attraction of bodies at a distance, and the entire solar system would fly apart. Without the Ether, light could not travel through space, and we would not be able to see the stars.

THE HISTORY OF THE ETHER THEORY

Until about 1600, physical scientists' understanding of the world was rudimentary and clouded. They thought of light as small particles of energy spewed forth from a flame or a star; they had no conception of gravity at all. A few ancient philosophers wrote of an intangible substance that propelled the planets in their orbits and created the domes of the heavens, and even used the term Ether to describe that substance. But for the most part, the sophistication of science had not reached a point where experimenters could understand and experiment for accurate results.

Descartes' First Insights into the Ether: In 1638, Rene Descartes proposed the idea of one all-pervasive Ether. He reasoned that light was not a particle, but a pressure or a wave that passed outward from a source. The sun shines on the earth, and for that warmth and light to pass from the sun to the earth, it must have a medium (the Ether) through which it is transmitted instantaneously. We see the sun in its brilliance because the energy of the sun presses so heavily upon the eye of the viewer.

In 1675, observations of the eclipses of Jupiter's moons demonstrated that light did not have an instantaneous velocity. Robert Hooke wrote in 1667 that if light was a vibrating motion of the Ether, rather than a direct pressure, it was possible to explain color as different rates of vibration. Although both of these comments refined Descartes' theory, it remained fundamentally sound.

Sir Isaac Newton (1672) addressed the entire Ether Theory and considered several alternative explanations, but was unconvinced by any of them. Among other things, he theorized that light consisted of particles which travelled through the Ether. His famous Inverse Square Law was phrased to explain some effects of the Ether, and his investigations into gravity produced the invention of calculus. While Newton himself never published a definitive study on gravity and the Ether, many of Newton's

followers were convinced that gravity, like light, was transmitted by the Ether.

The 18th Century: Intensive philosophical investigations into the nature of light and the Ether produced several detours on the road to truth. Thomas Melvill hypothesized that colors were determined by the velocity of light particles. When observations showed that the satellites of Jupiter did not change color as they wheeled in their orbits, the hypothesis was dropped.

Other experiments showed that the velocity of light appeared to be independent of its source. While this was understandable for wave phenomena, it is less comprehensible if light is composed of particles.

By the end of the 18th century, Newton's particle interpretation of light was disproven, and the understanding of light moving through the Ether as waves gained new ground.

The 19th Century: In 1800, Thomas Young explained light activity in terms of the wave theory of light, using thin soap bubble films. Colors on the thin films were related to the wave lengths of the light involved; the relationship proved that light had a wave length and thus had to be a wave phenomenon. By 1815, Augustin Fresnel described the mechanisms of light diffraction and interference using the wave theory of light. By 1816, Young and Fresnel had together produced an explanation of

light as a transverse wave in the Ether; it was the inevitable triumph of the wave theory of light over the ancient particle theory.

Originally, the Ether was thought to be a tenuous fluid, far less palpable than air. Young, however, knew that transverse waves required a rigidity that a fluid could not exhibit; he instead proposed that the Ether was a solid— a rigid solid which could transmit the transverse waves that were light, gravity, electricity, and magnetism. It soon became clear that the Ether was a remarkable substance unlike ordinary matter. It was rigid yet intangible; strong yet tenuous.

Theorists often concentrated on a single type of energy: light, magnetism, electricity, or gravity. Their writings did not make it clear whether they were hypothesizing one Ether for each energy type, or one grand Ether through which all energy flowed. In 1820, Hans Oersted discovered that an electric current could produce a magnetic field. In 1832, Faraday and Henry produced electricity from a changing magnetic force. The fact that electricity could produce light was rudimentary. The first steps were being taken to establish the facts about a single grand Ether which pervaded the universe.

In 1856, James Maxwell demonstrated that all electromagnetic and optical phenomena were explainable in terms of stresses in the one Ether.

Moreau's Etheric Investigations: In 1860, Etienne Moreau hypothesized that the Ether, like the matter and energy of the universe, was not evenly distributed. If it were instead affected by its interaction with matter, it might be distributed in vortices, thin patches, and even compacted clumps.

Moreau theorized that the interaction of matter, energy, and Ether indicated it was possible for each to be used to manipulate the other. Just as matter could be burned to release energy and energy expended to move matter, so could matter be used to grasp Ether and energy used to manipulate it.

THE PRACTICALITIES OF EXPLOITING THE ETHER

It fell to the practical science of Thomas Edison to explain and exploit the Ether. Enthralled by Moreau's theories, he entered into a collaboration with the man and undertook construction of a prototype device which could manipulate Ether.[†]

When his first prototype did not work, he communicated his dilemma to Moreau, who suggested that perhaps the atmosphere was interfering with the device. Tests with small models showed that it would operate properly at an altitude of 24,000 feet or higher.

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*E*nthralled by Moreau's theories, he entered into a collaboration with the man and undertook construction of a prototype device...

[†]In simple chemistry and physics, energy moves matter (through burning, exploding, expanding, or otherwise transmitting motion to matter as it is expended). Matter binds, then releases energy (for example, chemicals, coal, and wood hold energy within them, waiting to be released).

Edison created the "Movement Cycle" and "Release Cycle" diagrams explaining the influence of Ether on matter and energy.

Just as energy, by its existence, moves matter, so matter, by its existence, moves Ether, and Ether, by its existence, moves energy.

Similarly, just as matter, by its existence, binds and then releases energy, so energy, by its existence, binds and releases Ether, and Ether binds and releases matter.

Armed with this theoretical knowledge, Edison was able to create a prototype that could grasp the Ether and cling to it while propeling itself to great speeds.

THE ETHER
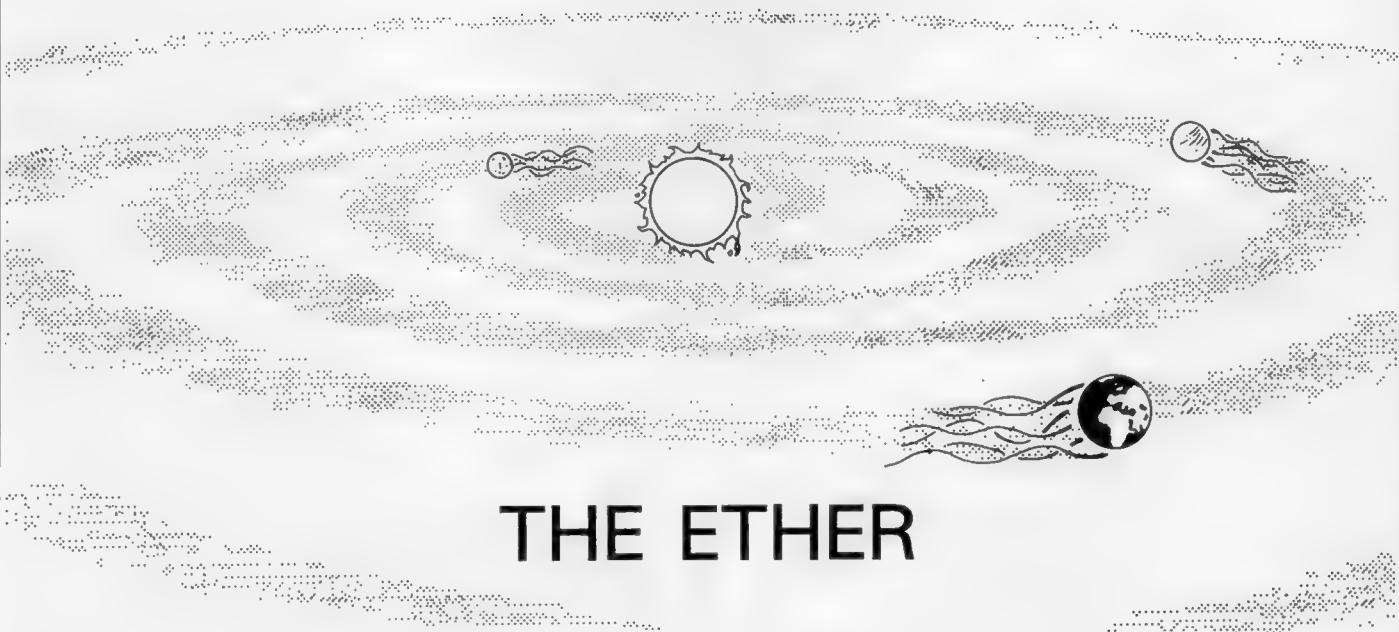
Edison's Movement Cycle explains the effects of matter, energy, and Ether on each other.

Energy induces movement in matter: Energy imposes heat and expansion which ultimately makes matter move. Much of technology is dedicated to channeling the movement which energy creates.

Matter induces movement in Ether: Its presence creates vortexes, stresses, and compactions which cause Ether to be unevenly distributed in the universe. The motions of the planets and the stars create the greatest disturbances in the Ether, but even small amounts of matter can contaminate its theoretical behavior.

Ether induces movement in energy: It was the investigation of how energy such as light moves through a vacuum which led to discovery of the Ether. Understanding the influence of Ether on energy helps to create an understanding of the universe.

Edison's Release Cycle explains the converse effects of matter, energy, and Ether on each other.

Matter (originally binds and then) releases energy: Chemistry and technology are dedicated to understanding how the process works in order to control energy.

Energy (originally binds and then) releases Ether: The basic forms of energy (electricity, magnetism, light, gravity) can be used to attach themselves to the Ether and to cling with great force until released.

Ether (originally binds and then) releases Matter.

It is the use of these cycles that allows the construction of an Ether Flyer. The Flyer itself is constructed of matter, and certain parts of it (magnetized structures, electric processors) bind and hold energy. The energy binds itself to the Ether. By rapidly turning the magnetic or electric structures on and off, the Ether can be grasped and released rapidly. If each point of grasp is advanced slightly, the net effect is a continual dragging of the material structure through the Ether.

Several different approaches have proven that construction of Ether Flyers is practical. One produces a spiral energy effect which propels the craft forward, much as a propeller moves a boat forward. The rotary approach electrifies immense metal wheels and sets them spinning; carefully placed electric contacts turn the energized regions on and off with precision and move the entire structure forward through the Ether.

An unusual application uses the Movement Cycle instead of the Release Cycle. A relatively small metal grid is pumped full of energy (magnetized, electrified, or even heated) and the Ether is allowed to act (move or press upon) the "sail." Such Ether-Clippers depend upon the local difference in speed between the Ether and the planets for their velocity; good pilots are essential for efficient courses and optimal speeds.

THE ETHERIC OCEAN

because Mercury orbits the sun once every three months, Mercuric turbulence spreads outward throughout the entire solar

THE CONQUEST OF SPACE

IT WAS the inventive genius of Thomas Edison that first harnessed the power of the ether, and made space the new frontier for the nations of Earth. In March of 1868, in Boston, Thomas A. Edison attended a lecture by Professor B. Etienne Moreau of the Sorbonne, on the subject of the luminiferous ether. Edison's many questions and pointed insights of a practical nature prompted Moreau to invite the younger man to talk with him, and so they sat in the lobby of Moreau's hotel for hours, engrossed in technical discussion.

As a result of this discussion, Edison came up with a notion of an Ether Flyer, a device which could "sail at speeds heretofore undreamed of through the lumeniferous ether, and reach any point on the globe in a matter of hours." Edison built a model immediately, and tested it. It did not move, and the young inventor was devastated. He wrote of his failure to Moreau, who considered the problem, and concluded that air was the culprit. Matter embedded in the ether causes drag, he reasoned, and the interaction of the ether and the air was too much for the prototype engine to overcome.

Tests, with small models in an evacuated chamber, showed that air was indeed the problem, and that if the machine could be lifted to a height of 24,000 feet or more, the atmosphere was thin enough for the engine to overcome its drag. Edison constructed a model and applied for a patent in October of 1868.

Skeptical patent officials demanded a demonstration, and Edison decided to use a hydrogen balloon to lift his invention into the air, and to fit his invention with a clockwork piloting mechanism and 250 pounds of magnesium powder, rigged to explode on impact with the moon, his target. The flash of the magnesium's detonation would serve as proof of the machine's arrival.

On 27 November, 1868, before a com-mittee of witnesses and an astronomer (who was to observe the machine with his telescope) Edison launched his greatest invention. The astronomer soon reported the appearance of a trail at a height of 30 miles above the surface of the Earth. The trail got fainter, and the astronomer eventually lost it. Edison anxiously awaited the detonation of the magnesium, spelling the astronomer at the telescope.

Early the next morning, in the chill Maryland dawn, a bright flash appeared in the Moon's *Mare Tranquilitatus*, remaining visible for several minutes, and witnessed by Edison, his friends, the astronomer, and the representatives of the patent office. Edison was ecstatic.

The patent for the Edison Ether Flyer was granted on 3 December, 1868, and Edison announced the formation of a company to build a larger flyer, capable of carrying passengers. The announcement was met with laughter in most scientific circles, and was the subject of several bitterly satirical cartoons in *Punch*. Edison finally managed to gather together a number of backers for an electrifying venture...a trip to Mars.

THE FIRST VISIT TO MARS

MARS WAS chosen as a destination for Edison's expedition because it was the closest suitable world. Earth's Moon was eliminated because it had no atmosphere to support the safe landing of the flyer (or so it was believed then).

A gigantic hydrogen balloon was constructed to Edison's specifications, capable of carrying the ether flyer, two passengers, and supplies for the trip. The balloon would carry the flyer high enough to enable the ether propeller to take hold, and would insure a safe landing at the destination. Power was provided by electrical storage batteries. To refresh the air, Edison took along numerous green plants.

Edison would go, of course, accompanied

BRITISH ROYAL NAVY
DUKE OF YORK-CLASS
INTERPLANETARY ETHER FLYER

BRIDGE

SOLAR
STEAM
BOILER

ETHER
TRANSPORT
DRIVES

LIFTWOOD
PANELS

12"VENTRAL TURRETS

by Jack Armstrong, a Scottish explorer and soldier-of-fortune with academic degrees in chemistry and geology. Armstrong was selected by the expedition's financial backers.

The expedition departed on 6 January, 1870, and arrived on Mars on 9 March. The balloon was damaged during the landing, and the expedition would have been stranded forever were it not for the serendipitous fact that Mars was inhabited.

Edison and Armstrong landed just outside the city now known as Syrtis Major, and were taken prisoner by the local potentate, Amraamtaba IX. Armstrong soon learned the language, and Edison impressed the Martian ruler with his tremendous technological knowledge.[†] The pair were soon freed, and Edison was provided with the materials necessary to repair his balloon, and to generate the hydrogen needed to fill it. Within months the repaired flyer was ready to carry Edison, Armstrong, and a curious Martian back to Earth. The return trip was without incident, and the expedition landed safely outside of Cincinnati, Ohio on the seventh of August, 1870.

The Earth was electrified. Edison and Armstrong received fame and fortune. Within a year, dozens of companies were manufacturing *Edison Flyers*, and flyers of several nationalities were soon making regular trips to Mars.

[†]As a result of Edison's visit, Martians to this day think half of all humans are deaf.

VENUS

ALTHOUGH EXPEDITIONS were sent to Venus as early as 1873 (using British-made Armstrong Flyers), the first one to return was the German-backed *Heidelburg* expedition of 1878. The Venusian magnetic field, it was discovered, was of an unusual intensity and flux; it radically accelerates liftwood decay. Within days of landing, the first three expeditions found their flyers would not leave the ground. Germany, unable to obtain large quantities of liftwood, was forced to make use of dirigibles as the lifting means for their Ether Flyers. Ger-

many has dominated the exploration of Venus since that time.

Venus is a world of perpetual overcast and heavy rainfall. The dense jungles of the lowlands produce many plants, for which there is great demand on Earth by dye-makers, drug companies, and florists (the Cytherian Orchid is especially valued for its beauty and fragrance). The lowlands are also home to varieties of giant lizards, called dinosaurs, and to the savage lizardmen. Humans find the lowlands unbearable, and stick to the few highland plateaus, where life is more bearable, and the sun can occasionally be glimpsed through the overcast.

A SCIENTIFIC DISCUSSION OF THE LUMINIFEROUS ETHER

PRIOR TO the 19th century, the corpuscular theory of light was generally accepted. Certain theoretical problems prompted important scientists (among them Benjamin Franklin) to advance the wave theory of light, summarized as: "Light is in the ether the same as sound is in the air."

The Luminiferous (light-bearing) Ether was essential to the wave theory of light. Ether was light's medium, like water for waves and air for sound. By 1868, Professor Moreau was perhaps the world's leading expert on the ether, and he summarized the theory in the introduction to his book *Promethean Promise*:

"The Luminiferous Ether is an infinitely hard, infinitely elastic underlayment to the physical universe. It is by virtue of the Ether that light, gravity, and magnetism can travel through the universe, all three being forms of energy that express themselves as waves in the medium."

Edison's practical inventive nature took these theoretical considerations of the nature of light, and produced a practical device which used them. His Ether Flyer worked by creating an electric propeller (the Ether Propeller) which creates waves in the ether and pulls the flyer along behind them. The interaction of the propeller with the ether produces a faint glowing trail behind the flyer, not unlike that of a comet.

COLONIALISM ON MARS

SEVERAL EUROPEAN powers have small outposts or bases on Mars: notably, the German military and commercial station west of Umbra, the French research facility in Nilokeras, and numerous diplomatic missions scattered across the face of the planet. Also, commercial interests from the Earth are becoming well established, and a small but growing military presence is manifesting itself in some of the principalities allied to, or bribed by, the colonial powers on Earth. Only two significant tracts of territory are held by European states on Mars, however: the Belgian Coprates and the Crown Colony of Syrtis Major.

THE BELGIAN COPRATES

THE BELGIANS first sent an expedition to Mars in 1876 and followed it with several more in short order. The early expeditions were ostensibly exploratory in nature, but were heavily protected by Belgian soldiers. The purpose of these expeditions was to study and explore the Great Coprates Rift Valley, and if the inhabitants of the valley were suspicious of the "true intentions" of the Belgians, subsequent events do little to contradict them. By 1884 there were frequent skirmishes between the Belgians and "Copraties"[†] up and down the length of the valley.

The Belgians vigorously protested the practice of American arms merchants selling the most modern rifles to the Coprates, a complaint that had little impact on American public opinion, and none whatsoever on the arms trade. In any event, the American arms merchants could point with

[†]The collective term "Copraties" has been applied to the inhabitants of the valley by the Belgians, although there are virtually no ethnic, linguistic, or cultural similarities between the inhabitants of the Upper and Lower Coprates Valley, the approximate dividing line being the shattered lowlands of Melas Lacus.

> ## THE HUMAN ENCLAVES
>
> The Belgian Coprates (Belgium)
>
> Syrtis Major (Great Britain)
>
> Western Dioscuria (Germany)
>
> Idaeus Fons (France)
>
> Hecates Lacus (Russia)
>
> Thymiamata (United States of America)
>
> Euxinius Lacus (Japan)

---

some moral justification to the fact that, insofar as modern arms might drive the Belgians from the valley, many would consider that a good thing. Although news reports were scarce from the Coprates, those which made their way out indicated that Belgian colonial rule there was even more brutal and bloody than in the Congo on Earth, if that was possible.

By 1889 the Belgians had completed the conquest (for it was nothing less) of the Great Coprates Rift Valley, and an uneasy peace had settled there. The flood of refugees into Tithonius, Ophir, and Aurorae Sinus, and their frequent forays back into the valley to raid Belgian gumme plantations, threatens to spread the violence. The Belgians, in return, have begun to undertake reprisal raids and punitive expeditions into neighboring territories. All of this fans the fires of antihuman prejudice throughout Mars. The atrocities committed by the Belgians are used as further evidence by the Worm Priests, Ground Cleansers, and other fanatical groups of Martians, of the need to drive the red devils off the face of Mars forever.

SYRTIS MAJOR

THE BRITISH first landed on Mars in 1872 on the Parhoon plateau, about 500 miles northwest of the Grand Canal junction of Syrtis Major. British relations with the Anwaak of Parhoon were cordial, and a thriving commercial colony was soon established within the walls of the city. Intrigue within the court, however, led to the assassination of the Anwaak, along with his son, in 1878. Although the British stepped in and crushed the coup in less than a day, the next surviving heir was a three-month-old infant. Establishing the infant on the throne, Queen Victoria assumed the regency of Parhoon, to be administered by a British commissioner.

The first Regent-Commissioner to Parhoon was Sir Phillip Adelaide, and his first crisis was war with the powerful city-state of Gorovaan. Only grudges and a tenuous dynastic claim led to an invasion by the Gorvaangian Army and fleet, which gave the British and Parhoonese a common foe to fight together. The Gorovaangian War was a complete success for the British, witnessed the combat baptism of the Parhoon Rifles,[‡] ended in the annexation of Gorovaan to Parhoon, and cemented very strong ties between the British and Parhoonese.

In 1880 war again broke out, (The Second War of the Parhoon Succession) and this time saw British regulars in the field since Britain was formally at war with Syrtis Major and its client states. The conclusion of the fighting saw Syrtis Major, Haatt, and Avenel incorporated as the Crown Colony of Syrtis Major. Parhoon and Gorovaan continued to be ruled by the Commissioner-Regent, who was also the Governor General of the colony. By 1882 both Moeris Lacus and Meepsoor were treaty dependencies of the colony. The "punishment" of Shastapsh in 1884, followed by an overland campaign in 1887, brought that city-state reluctantly under British rule. In a very short time the British had carved out a colonial empire of considerable dimensions. In contrast to the Belgians, the British have maintained fairly good relations with their Martian subjects, particularly the Parhoonese and Meepsooris. The Martian canal princes to the south fear them, however, and engage in endless intrigues to end their tenure on Mars.

[‡]Now the First Battalion, Queen Victoria's Own Martian Rifles (The Parhoons).

THE RED CAPTAINS

BY THE late 1870s there was a small supply of human ex-officers on Mars who were completely captivated with its exotic culture and environment, so much so that they began making their way as private citizens. Most of these men combined their military and aeronautical skills with a natural bent toward adventure and soon became a small brotherhood of human captains of Martian ships. The Martians called them the "Red Captains," because to a golden-skinned Martian a European's complexion is ruddy to the point of being red. They are accepted by the piratical Cloud Captains of the Shistomik Mountains as equals, albeit grudgingly, and are hated and feared by the High Martians of the Astusapes and further west.

The British captains are the most numerous of the Red Captains, and their outward independence does little to mask their basic loyalty to the crown. In many respects they occupy a place similar to that held by the Elizabethan Sea Hawks, and in a fairly short time they have largely displaced gunfighters as the most popular subject for American dime novels. The most famous of the Red Captains, and the one who has come to symbolize their essential panache, is Burnaby.

BURNABY

FREDERICK GUSTAVUS BURNABY was born to well-to-do parents on March 3, 1842. He attended all the best schools (Bedford Grammar School and Harrow Public School), and at the age of 16 became a coronet in the third regiment of the Household Cavalry. His interests were many, but mainly they focused on travel, particularly travel by air. At the age of 22 he made his first balloon ascent, and would go on to make a total of 19 balloon excursions. The first trip to Mars in 1870 electrified him with excitement and, already an officer of the British Aeronautical Society, he became a frequent writer in the pages of the *Times* on aeronautical matters.

By 1875, Burnaby was in the Sudan as a *Times* correspondent covering Gordon's campaign against the slavers, but soon became involved as an officer in Gordon's forces and began turning his active mind to the potential uses of aeronautics in a colonial environment. In '78 he ran for Parliament as a Conservative, but lost, and earned Gladstone's hatred. In '82 he became the first man to cross the English Channel in a steam-powered airship, which he had designed and built at his own expense. In '84, when the crisis in Egypt broke out, he requested permission to form an aerial squadron for operations against the mutineers, but was turned down. He went out on his own, however, and although his aerial steam launch did not see action, Burnaby himself was in the thick of things on several occasions. (As Burnaby was, by now, a Lieutenant Colonel in the Horse Guards, this constituted absence without leave, but no disciplinary action was ever taken.)

In the following year, with Gordon surrounded at Khartoum and Wollsley gathering an army to march to his relief, Burnaby again offered his services, and Wollsley gladly accepted. Burnaby's two steam launches (he had had a second built for the campaign) carried dispatches back and forth for months, harassed the dervish columns, and scouted ahead of the Desert Column. As the dervishes became used to the aerial vessels, however, they began devising means of bringing them under fire, and eventually the *Penelope* was badly damaged and crashed in the Nile. The *Vivian*, Burnaby's original boat, rescued the crew and later carried Gordon out to confer with Wollsley. Wollsley refused to allow Gordon to return to Khartoum, and Gordon still blames Wollsley for the fall of the city and its subsequent massacre. Although Gordon was safe, Burnaby's single remaining boat was unable to stop the southward march of the Mahdi's victorious army, or prevent the destruction of the Desert Column.

Late in the year, the government announced its intention to step up the production of aerial gunboats, but at the same time transfer all such vessels currently in government service to the Royal Navy. Seeing this as a deliberate affront by Gladstone, Burnaby resigned his commission and retired from the Army. Actually, Burnaby was facing a forced retirement anyway due to continuing heart problems. Freed of his responsibilities to the army, Burnaby emigrated to Mars in the hopes that the slightly lower gravity there would aid his health. Upon arrival, he was immediately drawn to the Red Captains and before long was commanding his own ship (the *Penelope*, named for the vessel lost at Khartoum). Idolized by most of the younger British officers, Burnaby was also soon accepted in Martian society as well. His facility with language soon enabled him to add Oenotrian, Low and High Syrtan, and Umbran to his existing linguistic catalog of French, German, Italian, Spanish, Russian, Turkish and Arabic. Furthermore, his unusual height (six feet, four inches) and massive 46-inch chest suggested a physical similarity to Martians that became the source of numerous crude, but good-natured jokes. Although he has only been on Mars for four years, he has come to symbolize everything good about the Red Captains, and has become something of an elder statesman for them.

THE LEGENDARY FIVE
THE FIVE highest-scoring Red Captains as of January 1, 1889:

Frederick Gustavus Burnaby—Steam Ram *Penelope*:
27 prizes, 43,200 tons.
Alonzo Quinton Freemerchant—Steam Gunboat *Baron Lortmore*:
21 prizes, 34,900 tons.
Frederick Armand LeBeg—Screw Ram *Gloire*:
17 prizes, 21,400 tons.
Michael Paget-Smith—Gun Kite *Lismore*:
15 prizes, 16,000 tons.
Arturo Diego della Mora—Screw Ram *Gato*:
17 prizes, 12,200 tons.

MARS: THE RED PLANET

LONG AGO, the seas of Mars (which once covered perhaps 40 percent of the world's surface) dried up. Over millions of years, some of the seas' water was locked into the oxides of the rust-red Martian soil; much of the rest was trapped into the polar ice-cap cycle. The planet became a desert.

The drying of Mars spelled the end for most mammalian life forms, and with their extinction came the next step in Martian evolution: flyers. Flyers could range far and wide in search of water and in search of the prey that water would support. Evolution and natural selection favored the emergence of a particular gland, in some animals, that negated the effects of gravity. These particular animals could float in the air and control their flight with wings—flaps of skin that control the orientation and strength of their lifting gland. At the same time, some Mar-

QUAINT MARTIAN COSTUMES

tian plants developed lifting effects of their own, primarily as a means of spreading their seeds.

THE CLIMATIC SPASM

ABOUT 35,000 years ago, a momentary spasm (in geological terms) in the Martian climate melted enough of the polar ice-caps to fill the ancient seabeds. As the seas refilled, the proto-Martians were either driven from their habitats on the seabeds, or were attracted to the sea shores because of the plentiful water. In either case, these gregarious beings found the spark that gave intelligence, and over several thousand years established first agricultural settlements, and later trade empires all along the shores of the newborn seas. As the Martians settled into the routine of agriculture, they lost their ability to fly (whether from evolutionary processes or from a dietary deficiency is unclear).

The Brifanoon—the Age of Water—lasted about 10,000 years. Empires rose and fell. Science reached incredible heights and made everyday life one of ease and luxury. Art naturally embellished architecture and equipment. Martian technology tamed the deserts beyond the flooded seabeds: It dug canals that carried life-giving water in a network that crisscrossed the planet's surface.

Ultimately, the climatic spasm that produced the Brifanoon (and with it the rise of intelligence on Mars) subsided, and with it the Age of Water ended. Over the next 10,000 years, the seas again dried up. Every year, the shoreline moved farther out. To stem this receding tide, Martian technology was called upon to create more of the canals that had tamed the Martian deserts. Every year, more canals were dug to carry water from the dwindling seas to the existing croplands. Eventually, it became clear that a coordinated effort was necessary, and a massive project was launched to channel water from the polar icecaps to the sea-
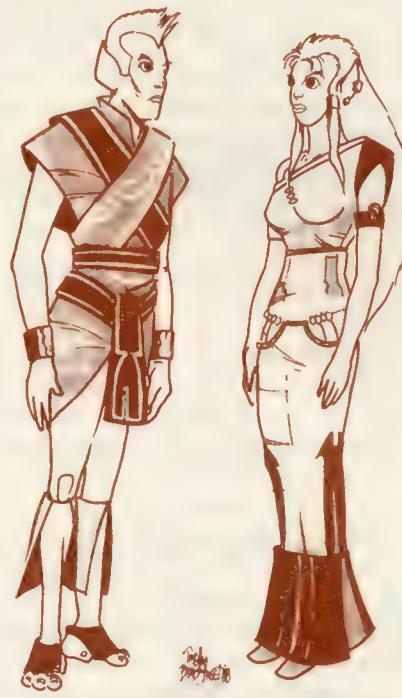
PRINCE JINMA OF PARHOON

beds.

When the naBrifanoon—the Age of Drying—ended, the Martian civilizations had moved from their shore territories to the bottoms of the dry seabeds. Immense Grand Canals stretched from pole to pole and from seabed to seabed, connecting individual city-states that arose at the junctures of the canals.

In the Martian deserts, the Grand Canals served as aquifers for land up to five miles to either side; in the seabeds, the quality of the ancient seabottom soil allowed the canals to aquify up to 50 miles to each side. The seabeds bloomed.

Yet life became harder than it had been. More work was necessary to make the seabeds bloom. Making the deserts bloom became a nearly impossible task. Populations gradually withdrew from the frontiers, and as they did, the Grand Canals of the deserts fell into disrepair. Scattered city-states squabbled over water rights, and eventually some of the seabed canals silted up and were abandoned.

By the end of the Age of Drying, Mars was a network of failing seabed canals, abandoned desert canals, and isolated city-states content to farm their own small holdings and to ignore the rest of the world.

SELDON'S EMPIRE

ABOUT 5000 years ago, Mars produced a great military leader, the equivalent of

Earth's Alexander the Great. Seldon II rose to power in the small mountain kingdom of Gaaryan (originally, it was the island kingdom of Gaaryan). Seldon II, already equipped with a kingdom by virtue of inheritance, raised and equipped a navy and sailed forth to clean and win the canals of Mars for the greater glory of Gaaryan. He confronted each city-state along his route of conquest, and from each he demanded oaths of allegiance and obedience. When he received them, he incorporated them into his growing empire; when they were not forthcoming, he levelled the city. A few such object lessons produced more signs of obedience than resistance.

Seldon II also provided a service by his conquest. Accompanying his warfleets were massive engineer barges that dredged silt from the canals. His constructors repaired broken locks, patched fallen levees, and cleared tangled settling pools. Where they could, they rebuilt pumping stations; where they couldn't rebuild, they built anew, although sometimes with cruder technology or makeshift devices. But by whatever means he used, Seldon II rebuilt and re-opened a third of Mars' seabed canals.

Seldon travelled a third of the way around Mars in his conquests. His world empire controlled more than any emperor had ever ruled in history. The city leaders who made the oaths of allegiance to him became the Canal Princes of Mars; virtually all Martian rulers today trace their power to those original oaths made 5000 years ago.

Seldon himself died at the height of his power in his temporary capital in what is now Syrtis Major. His son, Seldon III, succeeded him. The succession of Seldons lasted nearly 3000 years. The last of the emperors was Seldon LXIX.

But 3000 years is a long time for one government to rule. During that time, the influence of Seldon's Empire waxed and waned. In the end, the only consideration was whether the Canal Princes' tribute arrived on time...and often it didn't. The squabbles and arguments over tribute and taxes and water rights and canal maintenance caused more than one revolt among the Canal Princes. Finally, nearly 2000 years ago, the Princes unleashed their city-states' weaponry in a century long war that pitted warfleet against warfleet, army against army, and sky galleon against sky galleon. City-states were destroyed, canals were ruined, croplands were destroyed. Mars was reduced to many isolated city-

states connected by neglected canals and occasional cloudship voyages. It remained that way for nearly 2000 years...until the coming of the Earthmen.

Earthmen brought with them a vitality that Mars had not seen for millennia. Their technology, in many ways more primitive than that of the ancient Martians, was still more advanced than much of Mars' in the present day. The Earthmen arrived on a world that was content to fight small wars between small city-states; Earthmen were happy to participate for their own ends.

MARTIANS

THERE ARE three types of Martians: the civilized Canal Martians, the rugged Hill Martians, and the savage High Martians.

Canal Martians represent 35,000 years of civilization. They are consummate farmers, accomplished builders, skilled artisans, and clever diplomats. Their heritage reaches back farther than any Earth culture, and they are proud of it. Yet the Canal Martians are also a stagnant, slow-paced race. They know that their culture has forgotten more than any Earth culture has ever discovered, and they seem content with this knowledge. And as they stand content with their lot, the Earthmen are slowly taking over their world.

Hill Martians live on the edges of civilization. They are the frontiersmen of Mars, living in regions beyond the rule of the Canal Princes. The nomadic desert traders are Hill Martians, as are the Worm Hunters of the Mountains, and the rugged highland farmers.

High Martians are the least affected by civilization; they live in remote kraags and mountain tops, venturing out from time to time to capture slaves or loot passing caravans. High Martians are like intelligent apes when compared to Canal Martians, but

with a difference: They can fly! High Martians (so called for their altitude rather than their accomplishments) never lost their lifting gland and its ability to carry them through the skies of Mars.

LIFTWOOD

THE MARTIANS have long used liftwood. The earliest civilized Martians built simple rafts of liftwood to carry heavy loads or to travel deep into the trackless Martian wastes. Just as they built ships to sail the seas of Mars, they built cloudships to fly its skies.

But liftwood is both expensive and rare. It grows only in small groves on remote kraags...the same kraags inhabited by the savage High Martians. The result is constant conflict between the savages of the kraags and the shipbuilders of the canals.

There has never been enough liftwood to meet all of Mars' needs. Expeditions to harvest logs from the kraag groves must be large and well-armed. They are vulnerable to attack at any time and from any quarter by the flying High Martians.

Once upon a time, some explorers thought that all transportation should be by cloudship, but the practical matter is that there is not enough liftwood to meet the demand. Cloudships are expensive and suitable only to fast, high demand travel. On Mars, ordinary travel is handled by the canal ships.

THE CANALS OF MARS

VERY EARLY in the rise of civilization, the Martians learned to dig canals for irrigation and transportation. Originally, they carried water and ships from the seas deep into the interior of Mars. Later, that canal digging proved invaluable in slowing the collapse of Mars during the naBrifanoon.

The canals of Mars are not what we see from Earth. Instead, we see the vegetation

AERIAL VIEW OF ERYTHRIA IN THE MARE ERYTHRAEUM
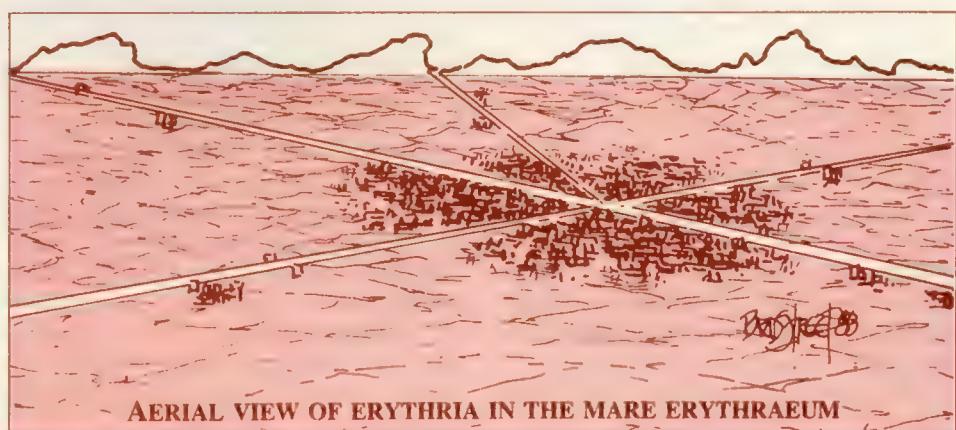
BARBARIC HIGH MARTIAN

swaths that the canals support and irrigate. The maria (seabeds) with their more fertile soil and extensive canal networks, appear dark because of the fields of agriculture they irrigate. The prominent canals of the deserts are highlighted by their narrower swaths of vegetation.

Grand Canals: Large Grand Canals are the major water carriers of Mars. Grand canals are between 1000 and 2000 yards wide, and run as deep as 100 feet. In some places, they widen into small lakes or water storage pools; in others, they narrow down to as little as 100 yards as they cut through rock faces or traverse small valleys on Martian-built aqueducts.

Grand Canals serve as aquifers on Mars. Some of the water they carry soaks into the ground and creates a water table that supports the croplands. In the ancient seabeds, this aquifer can reach as far as 50 miles to each side of the canal; in less fertile landforms, the aquifer is restricted to about five miles to each side of the canal.

Petty Canals: The smaller canals which branch off the Grand Canals are the Petty (from the French *petit*) Canals. They serve primarily as transportation links; farmers run small barges along them to carry goods to market. Petty Canals are truly small: in width, they range from 50 yards down to 10 yards; in depth, they rarely extend more than 10 feet. They can be long, however. Petty Canals stretch from the Grand Canal to the edges of the aquifer (as much as 50 miles).

Dying Canals: Age has taken its toll on the canals of Mars. Constant maintenance is necessary to keep them clear of silt and debris and to repair or replace mechanical devices such as locks, cranes, and pumping stations. In some places, the canal has silted up, creating a broad, shallow mudbank impassable by boat. Some canals are clogged by debris. Others have overflowed their banks to create vast marshes or swampforests. Where pumping stations have broken down, the canals are full of water only half the year (when the nearer pole produces meltwater to fill them).

Dead Canals: Some canals are truly dead. They are filled in with silt, dust, and sand, and carry no visible water. Even in these cases, however, the canal bed carries water in silent, underground channels. These dead canals can be recognized by the vegetation they support above ground: long straight stretches of green life in the arid deserts of Mars.

The dead canals are the caravan routes of Mars. Merchants use them as highways in the desert…paths to the isolated city-states of the Martian wastelands that still serve as a source of spice, liftwood, and precious gems.

THE MARTIAN FRONTIER

THE PLANET Mars is much smaller than the Earth. But much of the Earth is covered with the oceans; Mars is nearly all dry land. And the land area of Mars is about equal to the land area of all of the Earth. Much of that Martian land area is true frontier.

Much of Mars remains unknown and unexplored, even to the Martians. Earthmen, bringing their scientific curiosity and their search for knowledge and wealth, have mounted numerous expeditions to explore the vast deserts of the red planet.

Mars holds a great fascination for the people of Earth. The London papers are full of the chronicles of expeditions into the great Martian deserts: of visits to the great stone face of Cydonia, or the intricate subarean tunnels (below Mars' surface as opposed to Earth's, as is implied in *subterranean*) beneath Iapygia. Penny dreadful writers build pulp stories around the now dry dockyards of Gaaryan and hold their readers spellbound with accounts of flying ships and savage Martians. Children are fascinated by tales of monstrous Martian Sandwings weaving their way on the winds of stone valleys.

And the reality of Mars is even greater than the stories. Mars is a frontier ripe for adventure with riches for the taking. The Spanish conquistadores, who found gold laid at their feet, never encountered treasures like the liftwood, spice, and gems that Mars promises and delivers!

UMBRA
SAARDAAR
BOREO SYRTIS LEAGUE
MEROE
BALTIA
TANAIS
CALLIRRHOES
WESTERN DIOSCURIA
COLOE
ISMENILUS · DIOSCURIA
PROTONILUS
CYDONIA
MYLARKT
MEROE
ACIDALIA
CYDON
DINSOOR
KERAS
MARE ACIDALIUM
GOROVAAN
ARABIA
PARHOON
OXIA
EDEN
NILIACUS
HAATT
CHRYSE
MOAB
AERIA
MEEPSOOR
THYMIAMATA
SYRTIS MAJOR
SYRTIS MAJOR
AVENEL
MOERUS LACUS
EMDEN
ARYN
OENOTRIA
ARAM
AIRY
CROCEA
EOS
ARGUS
MERIDIANI SINUS EDOM
SABAEUS SINUS
ASTRAPSK
HYORAOTES
TOSSIA
SIGEUS PORTUS
DELTOTON
ERYTHRIA
HAMMONIS CORNU
PANDORA
SABEUS
OTEI
DEUCALIONIS
IAPYGIA
PYRRHAE
SERPENTIS
LARGO-SYRKIS
SKOROSIA
TOBANSOOR
NOACHIS
ERYTHRAEUM
IONIA
TALASTAAR
NOACHIS
GAARYAN
YAONIS
IDIA
HELLAS

MARS

Although the red planet is smaller than the Earth, its total land area is about equal to the surface of the Earth not covered by water.

CLOUDSHIPS OF MARS

WITH LIFTWOOD for power, and enormous sails or air screws for propulsion, the Martian sky galleons have become an important part of Mars' worldwide civilization. But these magnificent ships are a fairly recent addition to the rich Martian culture—a culture originated by beings who had no need for flying machines.

EARLY DEVELOPMENT

THE EARLIEST sentient Martians who developed primitive communities and civilizations were the winged High Martians, living amidst the rocks and crags of their mountain homelands. Neither their low population nor bickering tendencies exerted any great civilizing pressure, and centuries passed without significant progress.

When environmental and population pressures finally did produce changes— many High Martians were forced out onto the plains. Away from their native environment, these plainsdwellers soon lost the ability to synthesize the essential lifting ingredients from their surroundings, and their wings atrophied. And though these Martians were the ancestors of the Martians who would build their world's greatest empires and civilizations, they were originally easy prey for their still-winged brothers in the hills. High Martians often made slaves of their lowland relatives.

It was these slaves who had the first inklings of the value of liftwood. Long ignored by the High Martians, the slaves learned how to harvest, craft, and use wild liftwood for their own purposes, and more than one lowland Martian carried its secret away in daring midnight escapes, clinging desperately to liftwood life rafts, back to the plains beneath the mountains.

Forced to make the most of limited supplies of the precious liftwood, the canal people rapidly developed shipbuilding techniques, and the High Martians soon learned that trading liftwood for the riches of the lowland city-states was a safer and surer way to prosperity than trying to take it at spear point.

KITES—THE FIRST CLOUDSHIPS

DRAWING ON the technology of sailing canal ships, the Martians first developed wind-powered cloudships, or "kites." A kite is constructed with complicated sets of sails, much like the tall sailing ships of Earth. (With no mass production, each Martian craft is a custom-made vessel.) By using these sails, the crew can easily guide the ship with the wind at high speeds. Also, like a sailing ship, a kite has a limited ability to move against the wind by tacking back and forth across its direction of movement.

While the rigging arrangements on kites are complicated, they have the advantage of being fairly light, and thus kites can carry much more cargo than can a screw galley. Most merchant ships are kites, and the large gun kites can carry an impressive ordnance load. But at the same time, they are completely dependent on the wind direction and speed for their maneuvering power.

Whisperdeath-Type Large Kite

THE *WHISPERDEATH* is a large, heavily armored kite which has seen service in the navies of the Oenotrian Empire and some of the southern kingdoms. Because kites are so light, the larger ones can afford the extra weight of stonework armor in the hull—a very heavy luxury uncommon on Martian war vessels.

The hull is 200 feet in length, with an additional 30-foot ram in the bow. The topsails and keel extend nearly 100 feet both above and below the vessel. The topmen operate at a great distance away from the ship and often employ long ropes to swing them from position to position, especially below the ship. The stone armoring of the hull is placed in sheets between inner and outer wooden hull planking.

The ship mounts a variety of Martian weaponry. The bow mounts a single rod gun on the deck, so it may fire into three different arcs. It would be safer within the protection of the hull, but since this is a kite and subject to the wind direction, the gun would often be rendered useless if locked in a forward firing mount. Similarly, there are four heavy cannons, one on each wing and two mounted in the stern. The ship also carries some special Martian weapons: two drogue torpedoes, and two fire dispensers, one on each side of the ship.

The bridge crew of five, deck and topmen complements of seven each, and the 10 gunners combine to make a total ship crew of 29. Up to 10 marines are carried as well. The *Whisperdeath* can attain High altitude. It costs £59,340.
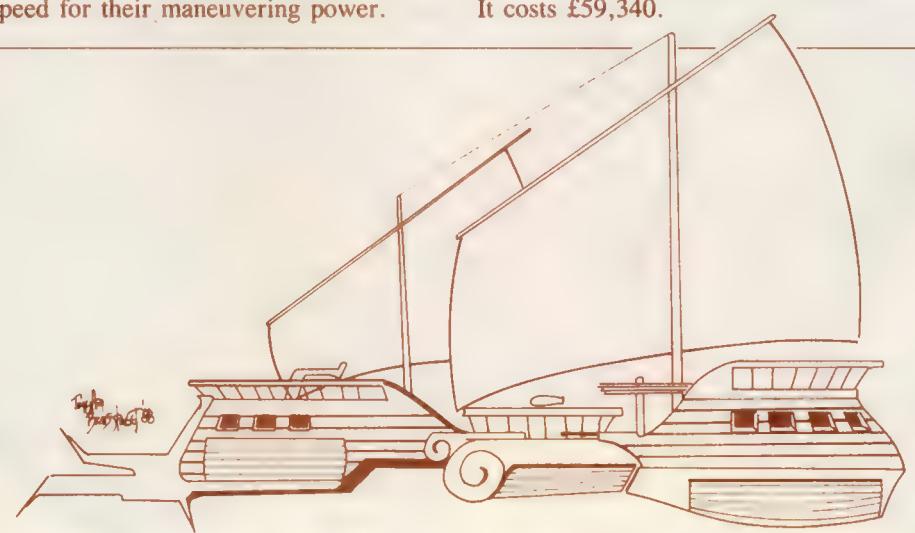
STATELY *WHISPERDEATH* LARGE KITE

Warm Winds-Type Large Merchant Kite

TYPICAL OF large merchant kites on the red planet, the *Warm Winds* Carrier was constructed in the southern kingdoms sometime in the 1850s. It has plied the air lanes since that time, being captured by pirates and rival merchants time and time again until its point of origin is in question. The ship's registry has been falsified many, many times. The kite is presently pressed into passenger and cargo service along the great canals around Syrtis Major.

By the standards of gunboats and cloudships, the *Warm Winds* is enormous, measuring almost 600 feet in length and 100 feet in width. Its rigging rises over 500 feet into the air. Designed to carry 30 passengers, it can also carry up to 2000 tons of cargo and still fly. For game purposes, the ship always has 1000 tons of cargo and is capable of flying at Medium height, as stated on its status sheet. Twenty rigging crewmen, twenty deckhands, plus six bridge crewmen comprise the 46-man crew. The *Warm Winds* costs £112,600.

Bloodrunner-Type Small Gun Kite

THE *BLOODRUNNER* was originally built as a present to the son of a wealthy merchant in Syrtis Major. When the merchant fell on harder times, he sold his son's toy to Shastapsh for some quick cash.

The *Bloodrunner* is built on a 100-ton hull. The masts and sails take up 10 tons, and one man can easily run them (the ship is only about 50 feet long).

This vessel carries two heavy cannons, one at the bow and one at the stern of the kite. Each weapon is manned by two crewmen and can fire into three arcs: both broadsides and either fore or aft.

The bridge crew of four—combined with one topman, one deckhand, and four gunners—gives the ship a total crew of 10. The ship can only attain High altitude, but can move swiftly with the wind during combat. It costs £7600.

Swiftwood-Type Small Kite

WITHOUT HEAVY armor, a small kite can carry a surprising amount of weaponry. The *Swiftwood* type is typical of kites in the Oenotrian Empire.

The hull is only 120 feet in length, with a hooked ram built onto the bow. The rigging is made of block sails extending above the ship some 50 feet.

The kite mounts one rogue gun on the bow, a light gun and a sweep on either side, and a power grapnel in the stern. The common tactic with this vessel is to fire with forward guns and broadside until past the target, then launch the power grapnel and drop sails to board with the 20-marine contingent carried on this vessel. If this strategy does not seem likely to succeed, the captain has the option to ram instead.

The *Swiftwood* has a total crew of 20, with five bridge crew, three deckhands, three topmen, and nine gunners. It can attain Very High altitude and costs £20,140.

SCREW GALLEYS—
THE TRIUMPH OF MECHANICS

MEANS OF propulsion other than sails had been in the planning stages for years. For instance, rowers below decks pulling collapsible wind scoops through the air, had been considered and even tested by Martian inventors eager to rise above the mercy of the wind, but such experiments ultimately proved impractical at best and disastrous at the worst. It was under the guidance of an enlightened warrior prince of Parhoon named Jinma, an inventor in his own right, that the first screw galley was tested. The battle against the Martian winds had finally been won.

A screw galley is dependent upon a number of turncranks—Martians put to work turning a crank shaft—most often running the entire length of the cloudship. Early versions of screw galleys relied on the crankshaft to turn the propeller directly. However, in 1871, a version was built by Prince Jinma of Parhoon incorporating a coiled flywheel. The turncranks spin the flywheel, which stores the energy necessary to power the galley. The propeller is driven by the flywheel. The improvement in crew efficiency and control of speed was so impressive that in a fairly short time the innovation had spread across the planet. It may not be coincidental that Prince Jinma received a pocket watch as a gift from an Earthman named Thomas Edison in 1870.

Hullcutter-Type Large Screw Galley

THE *HULLCUTTER* design sacrifices speed for additional firepower—a commodity found necessary when dealing with large, armored British vessels.

The hull is nearly 200 feet long, with 21 turncranks below deck. The ram is mounted to the bow and ends a solid wooden keel.

The *Hullcutter* is armed with a lob gun, two forward-mounted rogue cannons, one rear-mounted rod gun, and two side-mounted heavy cannons.

The crew totals 50, with seven bridge crew, seven deckhands, 21 turncranks, and 15 gunners. The ship also carries 10 marines, one of which is a marine officer. The ship can reach High altitude and costs £46,800.

Clearsight-Type Small Screw Galley

THE *CLEARSIGHT* design incorporates a large number of turncranks to give it a remarkable speed for a screw galley. Of course, the design sacrifices heavy armament to make room for the additional men needed to run the cranks and to accommodate the weight of the cranks themselves.

The hull is less than 100 feet long, with the characteristic connected large bow and stern sections. Twelve massive turncranks churning constantly below deck give the ship a speed of 25 knots. The four light guns mounted on the deck each face into a different arc of fire to cover all approaches. The crew totals 26 men. A *Clearsight*-type vessel can reach High altitude and costs £12,800.

HULLCUTTER
LARGE SCREW GALLEY
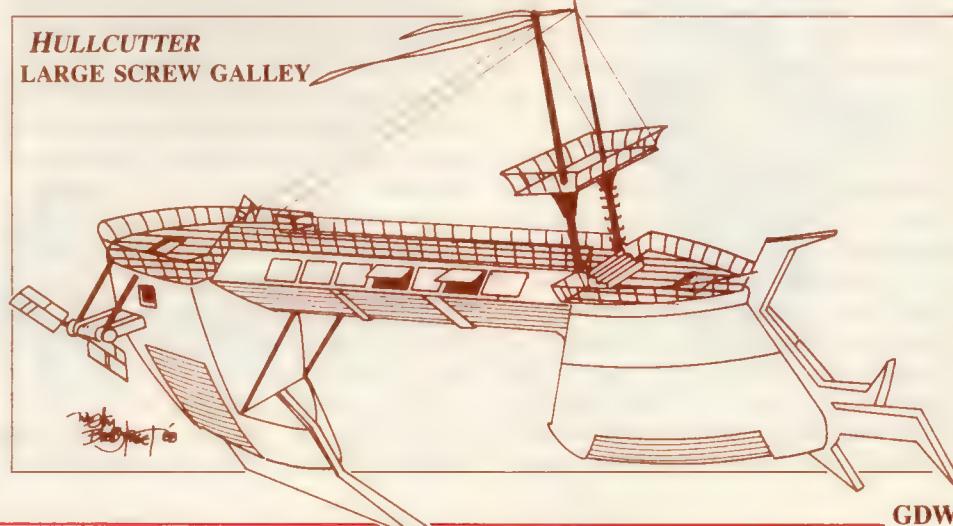
OENOTRIAN DISPATCH BOAT
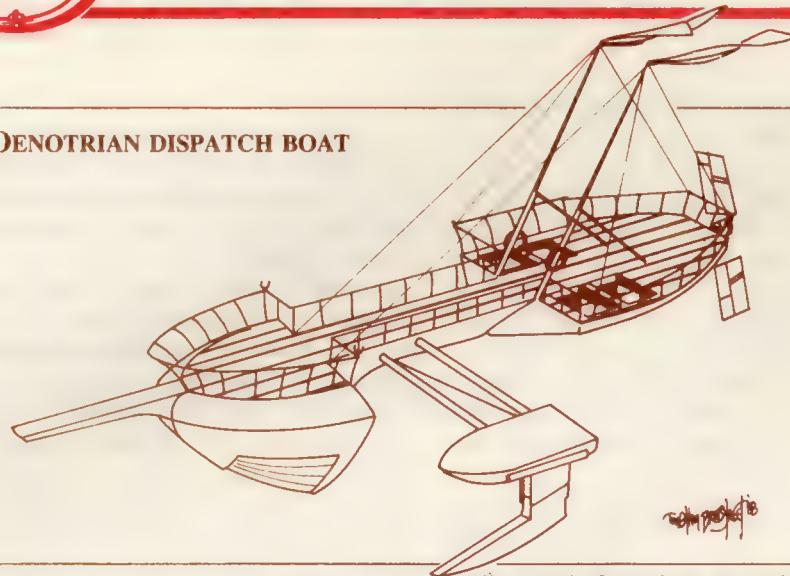
Small Bird-Type Small Screw Galley

THE *SMALL BIRD* is built on a small, 140-ton wooden hull. The ship is powered by six turncranks, but because the ship is so small, these are located on the upper deck instead of below (as they would be on a larger screw galley). The turncranks give the vessel a top speed of three (15 knots).

The design is built around a single large rogue gun, mounted in the bow of the ship. In addition to the main weapon, two sweepers are mounted, one on either side of the ship, to take care of antipersonnel needs. The crew totals 17. The ship can reach Very High altitude and has a value of £13,000.

Glory Sled-Type Screw Galley

THE HIGH MARTIAN LORDS of the various kraags have recognized the firepower and maneuverability of their British opponents. In response to that threat, they have made several attempts to construct heavier screw galleys to better oppose the British ships.

The *Glory Sled* design is typical of these more heavily armed galleys. The *Glory Sled*s were constructed for the navy of King Hattabranx himself, but both these ships were lost in their first action against the British in 1887.

The *Glory Sled* was built on a fairly large wooden hull, about 170 feet long and 35 feet wide. Twenty-one turncranks operated the propellers from below decks, giving the ship a maximum speed of three (15 knots). A *Glory Sled*'s armament was quite heavy, including a lob gun at the ship's center and a rogue in the bow. A heavy and two light guns on each side of the ship gave it a respectable broadsides firing capability.

Total crew of the *Glory Sled* was 53

sailors and 12 marines. It could only reach High altitude and was appraised at £44,840 by the Admiralty Prize Commission.

Fenian Ram Screw Galley

THE *FENIAN RAM* was originally commissioned by a Martian in the employ of an Irish separatist. Construction of the ship was begun in exchange for 20 bars of gold, a small fraction of its value. When nearly completed, the Irish revolutionaries made their move, seized the ship, and made good their escape under cover of darkness. The *Fenian Ram* has been harrying British activities on Mars for some time, and is crewed by Irishmen and Martian mercenaries, hiding out somewhere in the Meroe Badlands.

The *Fenian Ram* is a large screw galley, measuring almost 250 feet in length and about 45 feet in width. As its name suggests, its structure is built around a solid keel and a bow-mounted metal and wood ram which is designed to puncture either a wooden or metal hull. Thirty-two turncranks work in the hold of the ship.

The *Ram* is heavily armed. Central to its design is a lob gun—hand forged in the workpits of House Ktree of Alclyon—which is positioned in the center of the ship. The design also includes two forward-firing light cannons, plus two heavy cannons mounted port and starboard on extended platforms off the deck. To each side of the vessel is a single sweeper to help ward off any boarding actions. Full use of the ship's armament requires 13 gunners.

The seven bridge crew and eight deckhands, combined with the 32 turncranks and 13 gunners, give the cloudship a crew of 60. In addition, the ship carries a complement of 24 marines, including two marine officers. Due to its increased weight

the *Ram* can only attain an altitude of High, but has a top speed of four (20 knots). The *Fenian Ram* carries no special weapons.

The *Fenian Ram* is a one-of-a-kind vessel. Had it ever been purchased, it would have cost £51,600.

Sky Runner-Type Screw Galley

THE FIRST *Sky Runner*-type ship was constructed as a gift from a Princess of Umbra to her lover, a general in the armies of Syrtis Major. Its original designer, a slave himself, was in turn sold off to the shipyards of Alclyon, where a group of similar ships were commissioned over the next several years. The *Sky Runner* is still possessed by General Smyrta, but its sister ships have been traded and sold all over the red planet.

The *Sky Runner* is built on a wooden hull which measures 150 feet long and averages 30 feet in width. The *Sky Runner* has no ram in the bow—instead, it sports a carved bust of the Princess of Umbra.

The ship is armed with one rogue gun which can fire forward and to both broadsides. There is an extended gun platform on each side of the hull which houses a heavy cannon that can fire forward, astern, and into its respective broadside.

The *Sky Runner* has a crew complement of 32. The ship can attain altitude up to Very High and has a top speed of four (20 knots). It is valued at £25,600.

Endtime-Type Screw Galley

PERSONALLY COMMISSIONED by the Warlord of Shastapsh, the *Endtime* series of ships had at one time four members. The *Endtime* and *Forever* are both still in operation. The *Eternal Night* was lost in an aerial battle with pirates over the Nepenthes-Thoth Steppes. The *Eternity* crash-landed after a severe trim accident over that same stretch of land—only five of its crew made the dangerous trek alive.

The *Endtime* is built on a wooden hull measuring approximately 120 feet in length and 30 feet in width. It has 15 turncranks working in the hull to keep it moving and five deckhands to tend the ship in motion.

One lob gun is mounted in the center of the vessel, and a single rod gun fires from the bow. Two heavy guns are mounted on either side of the ship.

The *Endtime* has a total crew of 35. The ship also carries 10 marines, of which one is an officer. The ship can attain High altitude and a speed of three (15 knots). It costs £31,500.

BRITISH NAVAL ORDNANCE

THE BASIC ARMAMENT on the ships of the Royal Navy on Mars is the breech-loading gun. These weapons come in a variety of sizes, but principles are the same for all of them. An exploding projectile is fired through a rifled barrel; when the projectile hits another object, it explodes. The size of guns on British sky ships ranges from the one-pounder to eight-inch weapons. The eight-inch gun seems to be the upper limit for skyships that are anything more than floating gun batteries.

The Nordenfelt, Maxim, and Gardner guns are all rapid-firing weapons designed to affect the crews of opposing vessels. The Nordenfelt is the only one in use on Royal Naval vessels at present, but improvements in the other two weapons could change that in the near future. The Nordenfelt has five barrels each, fed from an individual ammunition hopper. The barrels may be adjusted to fire either individually or in a volley. When firing individually it gives the weapon a fairly high rate of fire. The Nordenfelt can continue to fire even if an individual barrel jams.

Drogue Torpedoes and tether mines are similar weapons. The tether mines are housed in liftwood buoys and left to float above a ship. (They are also floated above cities and shore batteries to provide defense against attack from the air.) Most ship-borne tether mines have a 20- to 40-pound charge which is detonated by a fulminate contact detonator. Drogue Torpedoes are hung over the side of a ship in order to attack target below the ship. British Drogues are usually made of iron and carry a 60-pound explosive charge with a contact detonator. Both of these weapons were Martian ideas, but the British have improved upon them considerably.

The Hale Rocket is 36 inches long and four inches in diameter. It is a brass tube fitted with nozzles at the bottom and filled with a solid propellant which, as it burns, discharges through the nozzles to propel the rocket. The nozzles are arranged so as to cause the rocket to spin as it flies, thus giving it a measure of stability. The Hale Rocket, standard on British ships, carries an eight-pound warhead with a contact detonator. Due to the inherent inaccuracy of these weapons, they are always fired in salvos.


HOTCHKISS ROTATING CANNON
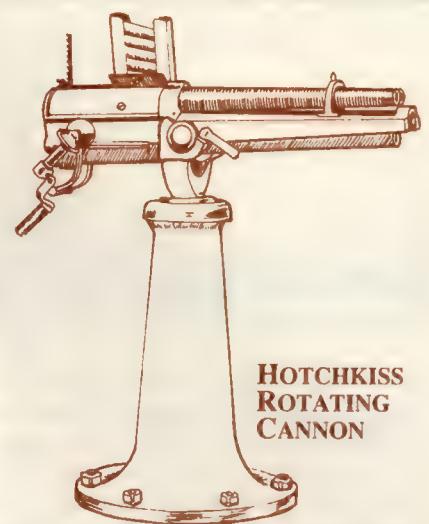
The Smutts Aerial Torpedo is a wrought iron cylinder, five feet long and eight inches in diameter. It carries a 250-pound explosive warhead which is detonated by a timed fuze. The torpedo is fitted with liftwood vanes, and is adjusted for neutral buoyancy before it is launched. This allows the torpedo to maintain a relatively straight course until such time as the fuze explodes the torpedo.

MARTIAN WEAPONRY

ALL MARTIAN cannons, including lob, rod, and rogue guns, are muzzleloading, black powder weapons at least 100 years behind the technology of British guns, but every Martian weapon is uniquely fashioned. Light and heavy guns are merely basic cannon. A rod gun is rifled and fires an iron rod designed for penetration. The rogue gun is the most powerful Martian direct-fire cannon. The lob gun is a huge rock-throwing mortar, but only one can be mounted on a single ship; if mounted anywhere but the ship's center, firing it would cause the ship to tip over. Sweepers are smaller, swivel-mounted grapeshot firing guns designed to clear the enemy's decks.

SPECIALTY WEAPONS

MARTIAN FIRE is similar to Greek fire and consists of burning oil that can be poured onto targets directly below the firing vessel. Accuracy is low, but the effects of a hit can be devastating. Tether mines are explosive charges with liftwood to carry them (buoying them up) and lines to guide them toward their targets or anchor them in place. Their main function is to prevent ships from passing overhead to drop liquid fire, but they have a limited attack capability as well. Tether mines are also often deployed as part of the defenses of a city or fortress. Drogue torpedoes are swung beneath the ship to hit targets below, and power grapnels on screw galleys are used to board enemy ships.
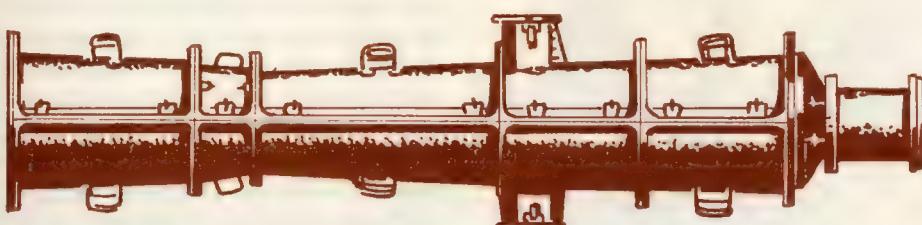
MARTIAN ROGUE
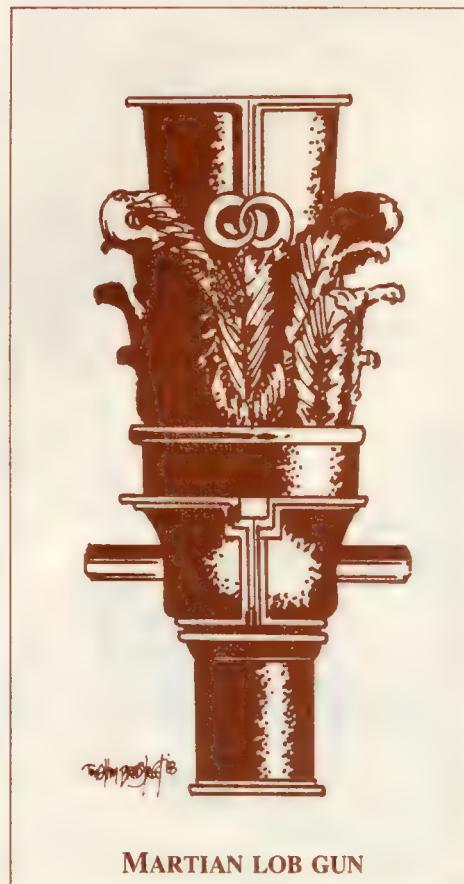
MARTIAN LOB GUN

THE ROYAL NAVY

WHEN THE British established themselves on Mars they brought with them a centuries-old naval tradition. Command of the seas on Earth had made the British into one of the most formidable powers on the planet, and the British on Mars realized the vital role that naval power would play in protecting and expanding their influence on the Red planet. It made no difference that the navies on Mars sailed the air, rather than the seas. Accordingly, the British quickly embarked on a program designed to install them as the preeminent naval power on Mars. The ancient Martian shipyards at Parhoon, which were the first to construct screw galleys, were brought under British control giving them limited naval construction capabilities until they could build their own shipyards. The British shipyards at Syrtis Major were complete by 1880, and were unique in their ability to construct armored, steam-powered vessels. In 1881, with great fanfare, the first two ships were launched from the Syrtis Major shipyards—a pair of *Aphid*-class aerial gunboats.

The *Reliant*-class gunboat (only one of this class has been constructed) is the largest example of the gunboat. It is 220 feet long and 80 feet wide. Although the *Reliant* is not heavily armored it is virtually bristling with weapons. Four fixed mount Nordenfelts fire to each broadside. Two six-pounder guns are mounted on the foredeck firing forward and to the respective broadside. Both the starboard and port sides boast pivot mounted six-inch guns, while the stern tower has a pivot-mounted, four-inch long gun. Eight Hale rocket batteries are mounted in pairs slightly to the stern-side center of the ship. As might be expected, all this ar-

mament reduces the heights at which the ship can sail, as well as the speed. The ship is propelled by steam-driven twin screws, and maneuver and trim are supplied by large stern rudders and a keel stabilizer as is standard on all gunboats. The *Reliant* has a bridge crew of six officers and men, an engine crew of six, 16 gunners, and a deck crew of 11 men, including three petty officers. The *Reliant* also has provision for 12 marines, bringing the total normal crew establishment to 51 officers and men. The *Reliant*-class gunboat represented a deadend in gunboat construction. Gunboats were originally designed to rely on speed and maneuver in order to accomplish their goals; the heavily armed *Reliant* was not in keeping with that concept and the class was abandoned in favor of the *Dauntless*-class gunboats.

Construction on the *Dauntless*-class gunboats first started in 1884. These ships represented a return to the idea that gunboats should be high-flying and fast, but they also retained the marine complement, extremely useful in boarding maneuvers, which has proved quite valuable on the *Reliant*. Measuring 160 feet in length and 50 feet across, the *Dauntless* class also continues the custom of only lightly armoring gunboats. The firepower for these ships is provided by two four-inch long-barrel guns, two three-pounders and two Nordenfelts. A four-inch gun is mounted in the hull at the bow of the ship; while this provides protection for the gun and the crew, it limits the gun's field of fire to 90 degrees. The second four-incher is pivot-mounted on a stern tower for more flexibility in arc of fire. Two wing positions on either side of the ship boast the pivot-mounted three-inchers. The two Nordenfelts are fixed-mounted, one on each side of the ship. Trim and maneuver equipment is about the same as the *Aphid*-class; large stern rudders and a stabilizing keel. The first two *Dauntless*-class ships were twin screw, steam-powered vessels. However with the introduction of the forced-draught steam engine, which is more compact than the older style engines, the next *Dauntless*-class ships have a triple-screw arrangement. The crew of a *Dauntless*-class vessel totals 33 officers and men. Five men make up the bridge crew, four men man the engine room, 8 men are gunners, and six men are deckhands. A platoon of 10 marines round out the crew of the *Dauntless*-class. At present there are only two *Dauntless*-class vessels on Mars.


BRITISH *RELIANT*-CLASS AERIAL GUNBOAT
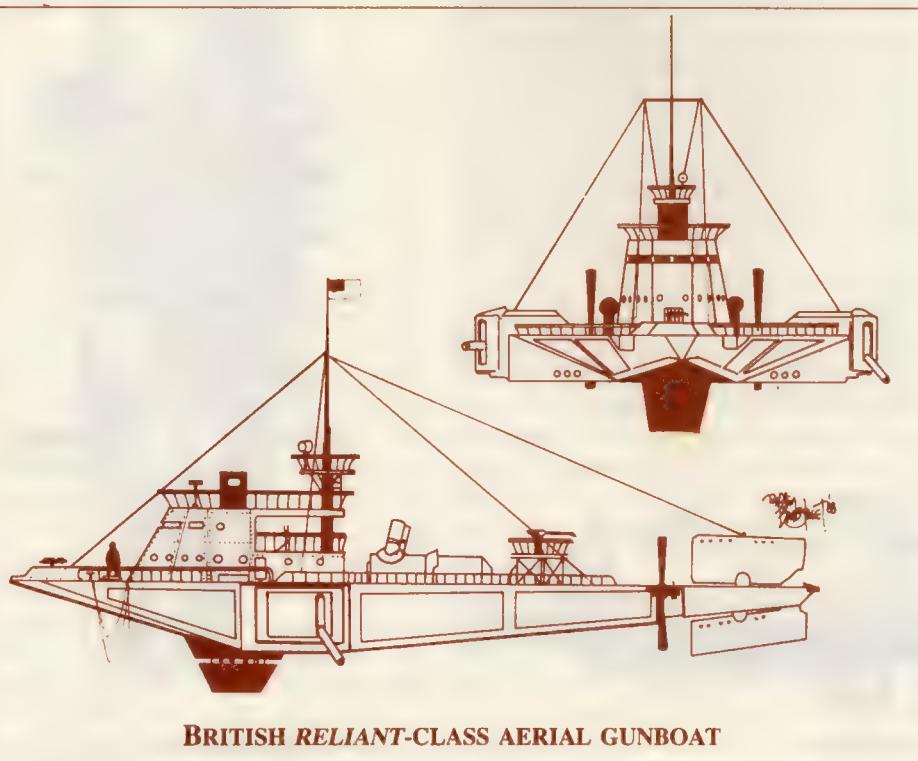
The *Aphid*-class gunboats were the first armored vessels ever to sail the skies of Mars. These ships are only 90 feet long and 30 feet wide and very lightly armored; the *Aphid*-class being purposely kept small in order to provide a high-flying, fast-pursuit gunboat. Armament on *Aphid*-class gunboats consists of a four-inch short gun pivot-mounted on the foredeck. This mounting allows the gun a broad, 180-degree field of fire. One-pound pieces are pivot-mounted on each wing mount position, and there is a fixed-mount Nordenfelt on both the starboard and port sides. The *Aphid*-class is a driven by twin screws powered by a steam engine. A dynamo, also powered by the steam engine, supplies a limited amount of electricity which is mainly used for running lights and signaling equipment on board the ship. Trim and maneuver is provided by large rear rudders and a keel stabilizing fin. The normal crew establishment is 15 men. At present there are four *Aphid*-class gunboats in service in the British Royal Navy on Mars.

The *Thunderer*-class monitors began construction in 1884. Basically a floating battery used to engage enemy vessels at long range, only one *Thunderer*-class ship has been completed thus far. *Thunderer*-class ships boast an eight-inch gun mounted in a revolving armored turret at the bow of the ship, and a six-inch gun in a revolving, armored turret at the stern of the ship. Four Nordenfelts are fixed, two to each side, as antipersonnel weapons. Two batteries of Hale rockets round out armaments of *Thunderer* class. The *Thunderer* class usually goes into action with *Aphid*- or *Dauntless*-class gunboats. The combination of small, highly maneuverable ships, and a long range, powerfully armed vessel has proved a potent partnership. The crew of the *Thunderer*-class ships is composed of eight engineers, four bridge crew, 10 deckhands, nine gunners, two officers, and three petty officers. Twelve marines are also on board, but mainly to prevent boarding, as the favorite motion tactic has been to try and overwhelm large British ships and board them. The first *Thunderer*-class ship was being completed just as the forced draught steam engine became available, and this modern power plant was installed in the vessel. The steam engine drives twin screws and powers the gun turrets. Currently only one *Thunderer*-class ship has been built but at least two more are expected to be constructed.
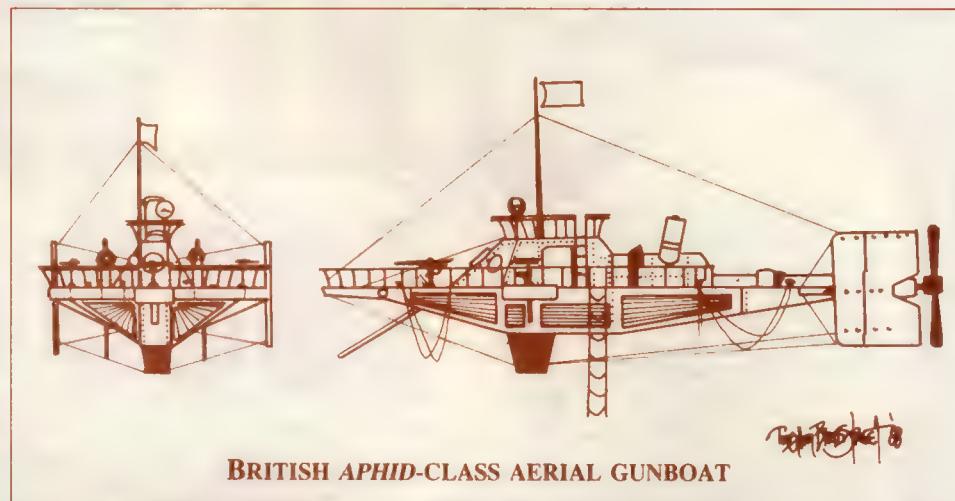
BRITISH *APHID*-CLASS AERIAL GUNBOAT

The *Triumph*-class cruisers are to be the most modern and formidable ships in the Royal Navy on Mars. Decently armored and packed with firepower, these vessels are equipped with the latest technology. Measuring 325 feet in length and 80 feet in width, the *Triumph*-class is the largest armored ship on Mars. The armament includes one six-inch gun on a bow-mounted pivot, a four-inch, long-barrel gun pivot-mounted on each wing position, a five-inch, fixed-mounted gun firing to the stern, and a Smutts discharger. Other weapons on the *Triumph*-class ships include tether mines, drogue torpedoes, four Hale rocket batteries and four Nordenfelts for close self-defense. A modern, forced-draught, steam engine powers the large twin screws, and drives a dynamo supplying a limited amount of electricity. The ship carries four bridge crew, 10 engineers, 12 deckhands, 15 gunners, two ship officers, and four petty officers. Ten marines are part of the ship's complement also, and most often employed in a self-defense role. The *Triumph*-class cruisers are designed to operate independently, but will often be used in conjunction with gunboats. While only one has been completed, several more are being considered and two have already begun construction.
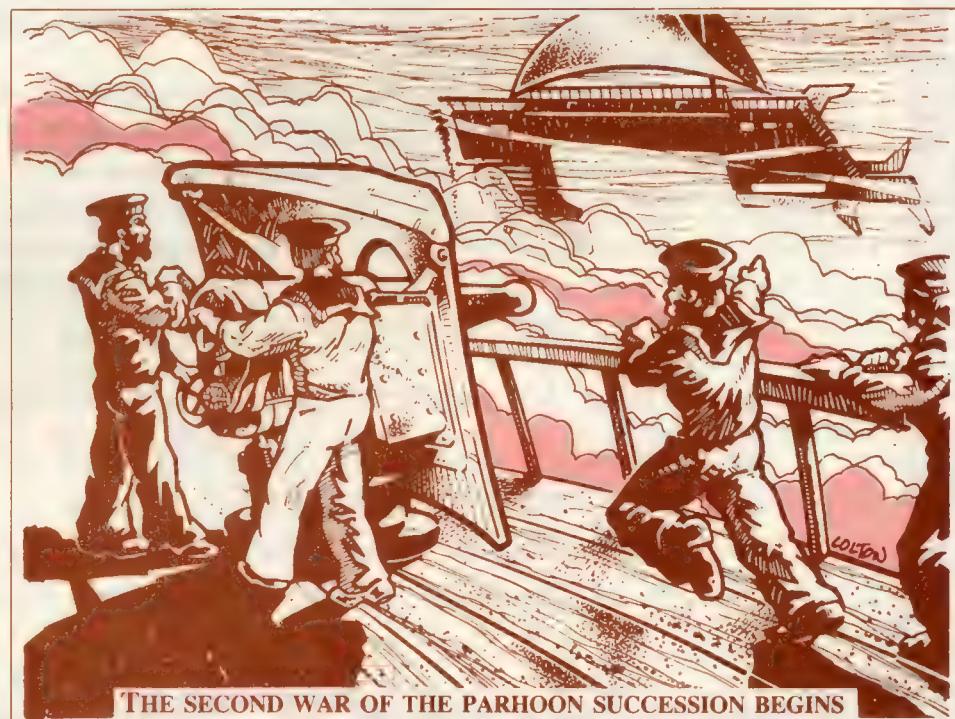
THE SECOND WAR OF THE PARHOON SUCCESSION BEGINS

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The new Art Director is Vince DeNardo, currently Art Director for both Fire & Movement and Computer Gaming World magazines. Vince is giving Space Gamer / Fantasy Gamer a new look, dynamically improved over previous issues, and an advance for all magazines of this genre.

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BUNDLES   A   B   C   D   E F   G   H   I   J   K

TRAVELLER NEWS SERVICE

VLAND/VLAND (0307-A967A9A-F)   **Date: 074-1118**

¶The latest recorded tirade by Oekhsos, the violently charismatic Vargr leader, arrived by special packet from beyond the Imperial border today.

¶In addition to the standard anti-Imperial ranting and raving, the video included a sequence showing a human mission to assassinate Oekhsos.

¶The clip details the mission's progress through the Knouksarrgh Ong complex on Lair, and culminates in a violent attack on Oekhsos himself.

¶In the climax, the human attackers are destroyed, and Oekhsos is unharmed and laughing uproariously.

¶Although on-screen evidence indicates the mission was Vilani in origin, local officials denied that any official sanction was given to the assassination plot.

USDIKI/GUSHEMEGE (2224-A8889AB-E)   **Date: 204-1117**

¶The Emperor Strephon stepped onto the balcony of his vacation palace here today and was greeted by a thunderous response which cut short his prepared remarks.

¶"Strephon Lives!"

¶Statements by Strephon's aides indicated that Dulinor's assassination attack killed a double who routinely filled in for Strephon at routine functions.

¶Strephon himself was safely and secretly en route to the Imperial depot in Core sector.

¶When news of the assassination attempt reached Strephon, he proceeded to Gushemege and the relative safety of the vacation palace.

¶Strephon's closing remarks called for the Imperium to rally to his banner and bring the rebellion to an end.

IMAPARLU/GUSHEMEGE (1616-B885AA9-E)   **Date: 301-1117**

¶The Efont of Imaparlu, exercising his authority as Supreme Civil Leader of the planet, today announced its unswerving allegiance to Strephon and to the Imperium.

¶The move took supporters of both Dulinor and Lucan by surprise as pre-dawn round-ups by the police moved known agitators to holding camps.

¶The general population, accustomed to direct leadership by the Efont, appeared to accept and support his decision.

DLAN/ILELISH (1021-A8D1ADE-G)   **Date: 022-1118**

¶The Emperor Dulinor has dismissed the reappearance of Strephon as the work of an impostor:

¶"The man who routinely impersonated Strephon is now playing the part of his life.

¶"Who would believe that a mere actor would have the audacity to think that we would believe he is the Emperor.

¶"Now his claims insult the memory of our Strephon.

¶"I loved our former Emperor; I was forced to kill him for reasons of state and for the greatest good of the greatest number.

¶"For this impostor to claim that he is Strephon is an insult to all of us!"

¶In later comments, Emperor Dulinor denied that he himself has ever used a double to substitute at routine court functions.

CAPITAL/CORE (0508-A586A98-F)   **Date: 043-1118**

¶Emperor Lucan has rejected the possibility that Strephon still lives.

¶"We know that Strephon sometimes used a robot to impersonate himself at routine functions. And we know one of them is now missing.

¶"Sources tell us that this thing that claims to be Strephon is, in reality, a robot. Heaven help us when his batteries run down!"

CAPITAL/CORE (0508-A586A98-F)   **Date: 051-1118**

¶A garbled xboat courier message, apparently damaged in transit, indicates that Vargr raiders have, through an act of barbarism, destroyed the outpost at Chunwi in Corridor sector.

¶Vargr corsairs in the Chunwi system attacked and siezed the merchant liner *Hyukt Moi* with 78 persons aboard, demanding ship repair priviledges, plus fuel and weaponry from the outpost.

¶When refused, the Vargr commander went wild, set course for the *Hyukt Moi*, and sent the liner plunging into the outpost itself.

¶Exact figures on casualties and damage are unknown. Apparently, the Vargr attempted to disrupt xboat passage through the area, which does threaten to cut communications with the Spinward Marches.

Generating IRIS Characters
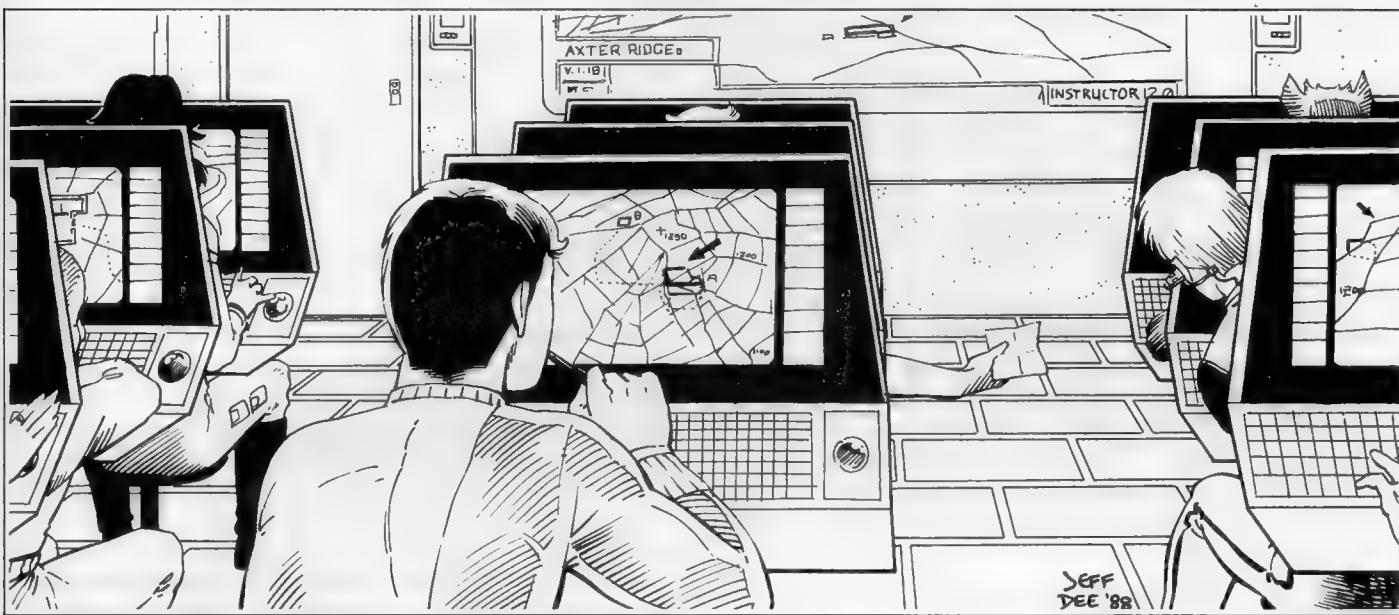
IRIS' duties, and the method and manner in which they are performed are fully described in this article outlining the Regency's operations and history. It should be consulted by players and referees who want to get the proper "feel" for IRIS.

GENERATING THE IRIS CHARACTER

These tables and guidelines are used in the same fashion as the Advanced Character Generation Tables of *Supplement 4* and *5*, or **MegaTraveller.**

Initial Preparation

Generate the six character attributes in the usual manner.

Eligibility for Application

Because of the demanding nature of intelligence work, IRIS has strict minimum prerequisites for personal attributes of prospective applicants. Each of the three service branches of IRIS has different criteria.

IRIS' MINIMUM PREREQUISITE CRITERIA

| | Minimums | | | | | |
Branch	Str	Dex	End	Int	Edu	Soc*
Covert	7	9	7	A	A	5-A
Strike	8	9	8	8	8	5-A
Op'ns	5	7	5	A	A	5-A

*In the case of Social Standing, there is not an acceptable minimum, but rather an acceptable range.

Acceptance of Applications

If the applicant meets the minimum criterion of one or more of IRIS' three branches, he will be accepted by a given branch on a roll of 10+ (no DMs). In the event that the applicant qualifies for more than one branch, the branches will consider appointments in order of "branch priority." In descending order (highest to lowest), branch priority is ranked Covert, Strike, Operations. An applicant may reject an appointment with a branch he does not desire, but the rejection of an acceptance by a high-priority branch in no way affects the odds of acceptance in lower priority branches. In each case, acceptance occurs only on a roll of 10+.

Branches

IRIS characters work in one of the following branches:

Covert: Covert operatives are usually engaged in clandestine activities, frequently outside of Imperial borders. They enlist for a single hitch of five four-year terms (20 years).

Strike: Strike operatives are the "commandos" of IRIS. The operatives enlist for an initial hitch consisting of two four-year terms.

Operations: Operations operatives are involved in the support side of intelligence work. The operatives enlist for an initial hitch consisting of two four-year terms.

ASSIGNMENTS AND SKILLS

The following describes assignments and skills.

Basic and Advanced Training

BT and AT take up the first year of a character's first term with IRIS. The character does not undergo the normal assignment resolution procedure. Instead, the character receives two skills as a result of basic training. One skill is rolled on the Branch Skill table, and the other is a Gun Combat skill, the type being determined by the character's service branch:

Covert Trainees: Handgun or Combat Rifleman (player's choice)

Strike Trainees: Combat rifleman

Operations Trainees: Handgun

The character's advanced training is an assignment to one of the Special Duty programs (roll to determine which program).

Assignments

Each one-year assignment is resolved separately. Resolution is a two-step procedure: The specific assignment is determined by a 2D6 roll, and that assignment is then resolved in terms of survival, commendations, promotions, and skills. These are resolved in exactly the same fashion as in other Advanced Character Generation Systems.

The one exception is that IRIS strongly disapproves of "grandstanding."

While characters are permitted to take negative "survival" DMs in order to take an equal but positive "commendation" DM, if IRIS finds out about this (they will do so on 8+), IRIS will prevent any promotion resulting from that assignment and also demote that individual by one rank. Similarly, if a character is discovered to have evinced cowardice (taking a positive survival DM in exchange for a negative commendation DM), IRIS is equally likely to find out. In addition to preventing any promotion resulting from that assignment, IRIS will demote that character by two ranks. Quite simply, the philosophy is that Imperial intelligence needs should never be placed in jeopardy because of personal dispositions, whether courageous or craven.

Commendations and Morale Determination

Note that IRIS issues "commendations" which can influence promotions. However, for purposes of determining the character's morale (Supplement 4: Mercenary), the character's assignment history is used. Security assignments earn the equivalent of 1 csr, raids earn the equivalent of 1 csr (and 1 CoCo if the character is O5+), and infiltrations earn the equivalent of two csrs.

Promotion

IRIS characters are eligible for promotions every year of every term in which their assignment offers them the possibility. If a character receives a commendation, all subsequent promotion rolls that term receive a DM +1. Further commendations do not produce further DMs. Promotions above IRIS rank O10 (Assistant Director) are handled in a special fashion since this changes the character's status considerably.

Promotion to the Directorate

This is a major step for a character since advancement into the Directorate effectively "marries" the character to IRIS for the rest of his life. At this level, characters become privy to information that is so confidential and sensitive that "retirement" is no longer an option for them; the inherent security risks are too great. Any character who advances into the Directorate is generating a player character whose activities will be dictated to him by the upper echelons of IRIS (the referee), allowing him no freedom of action. IRIS characters of this rank are much better left as NPCs.

Upon completing 20 years of service with IRIS, operatives may become candidates for advancement into the Directorate. For Strike and Operations operatives, they must rank O10 before their candidacy is checked. Their candidacy is reviewed at the end of the term in which they attain rank O10. Covert operatives have their candidacy reviewed at the end of their 20-year hitch regardless of their rank.

In order for candidacy to the Directorate to be confirmed, the aspiring candidate character must roll less than or equal to 1/2 their Intelligence (round fractions down) on 2D6. DM for Strike operatives is +3. DMs for Covert operatives are −2 for all characters, and +1 per operative rank less than 10. Operations operatives have no DM. Failure to be confirmed for the Directorate results in honorable discharge. Confirmation of candidacy permits the operative to continue to advance in rank and gives him an automatic promotion to O10 for any Covert operatives of lower rank. Directors roll for assignments as Operations operatives, with a DM −2 on all promotion rolls. Directors may only promote once per term.

Skills

A character may receive skills as a result of his or her assignment. If the character rolls the indicated number or higher, then he or she becomes eligible for one skill to be determined immediately. Operatives may always roll on their Branch Skill Table and the IRIS Life Table. They may also roll on the Assignment Table that matches their duty assignment at the time of receiving a skill roll. Covert operatives who are assigned to other branches may roll on that other branch's Skill Table that year.

Covert Operatives and Bonus Survival Skills

Any covert operative that lives through three or more infiltration assignments in a single term may receive up to three bonus skills. They are rolled for separately at the end of that term and are gained on a roll of 5+ on 1D6. They are Recon, Tactics, Jack-of-All-Trades.

Special Duty

Characters may be assigned to special duty by the Assignment Tables. In that event, consult the appropriate assignment for resolution.

Medical School: The character receives two levels of Medical skill automatically. Characters who receive this assignment and already have Med-3 have a two-thirds chance of being assigned as an instructor (character automatically receives one skill level of Instruction). If the character is already Med-4+, he automatically receives one level of Instruction skill instead of any Medical skill.

Interrogator School: Roll 1/2 1D6 (round fractions up). The result equals the levels of Interrogation skill awarded. Characters who receive this assignment and already have Interrogator-3 have a two-thirds chance of being assigned as an instructor (character automatically receives one skill level of Instruction). If the character is already Interrogator-4, he automatically receives one level of Instruction skill instead of any Interrogation skill.

Intelligence School: Roll one die to determine receipt of each skill; 5+ for Interrogation, Liaison, Admin., Streetwise.

Naval Studies: Roll one die to determine receipt of each skill; 5+ for each of the following: Pilot, Ship's Boat, Navigation, Vacc Suit, Zero-G Environment, Gunnery.

Command College: Roll one die to determine receipt of each skill; 5+ for each of the following: Tactics, Ship Tactics, Recon, Combat Engineering.

Assassination Training: Roll 1/2 1D6 (round fractions up). The result equals the levels of skill awarded of any of the following: Gun Combat, Blade Combat, Brawling (character's choice as to specific skill). Characters who receive this assignment and already have one of these skills at level-3 have a two-thirds chance of being assigned as an instructor (character automatically receives one skill level of Instruction). If the character is already at level-4 in one of these skills, he automatically receives one level of Instruction skill instead of any of the listed skills.

Commando School: As per Book 4, Mercenary, but substitute Battle Dress for Vacc Suit.

Transfers

Under no circumstances are IRIS operatives allowed to transfer from one branch to another.

Reenlistment

Strike and Operations operatives may automatically reenlist up to the end of the term in which they reach O10. At this point, they must either receive a confirmation of their candidacy for the Directorate or they receive an honorable discharge. Covert operatives may not reenlist after their five-term hitch; they must either receive their confirmation as Directorate candidates or receive an honorable discharge.

Retirement

Characters may retire at the end of any term, beginning with the end of the last term of their initial hitch. Characters who are eligible for Directorship candidacy but do not wish to pursue it must retire.

Mustering Out

Mustering out is conducted in exactly the same fashion as other **Traveller** character generation systems. One roll is granted per term of service. Retirees of O10 add 1 to their die rolls. Pension equals Cr1000 × operative rank at the time of retirement.

Special Conditioning for Covert Operatives

This should only be determined after a character has either a) mustered out, or b) advanced into the Directorate. IRIS employs two special conditioning techniques in the case of a small number of Covert operatives. These are hypnotically suppressed psionic development, and anagathics treatments. All Covert operatives are tested for psionic potential immediately upon entry into IRIS, and all operatives who test 9+ for psi strength and positive for telepathy talent are noted for possible future development. Whether or not the operative shows this promise, memory of the testing (and training, if any) is hypnotically (and psionically) suppressed. Knowledge of this testing is restored only after the completion of the 20-year hitch and only if the operative becomes a candidate for the Directorate. The reasons for this procedure are explained in detail in the accompanying article outlining IRIS' operations and history.

Secondly, in order to take advantage of lower suspicions typically generated by the very young as well as greater receptivity to plastic surgery, IRIS keeps a very small number of its Covert operatives on a schedule of anagathics maintenance. Roll 12 on 2D6 for a Covert character to have been on such a maintenance program, DM +2 for individuals with psionic potential 9+. Roll 1D6: 1-4 means that the character was on half-maintenance, meaning that he aged one year for every two spent in the field; 5-6 indicates full maintenance, in which the character was not allowed to age at all. Note that psionic characters on full anagathic maintenance are given no training in psionics; they are only tested. As per **MegaTraveller** Player's Manual, these individuals suffer no loss of potential.

NEW SKILL: MARTIAL ARTS

This skill is similar to Brawling but represents a more scien-tific approach to hand-to-hand combat. Whereas Brawling emphasizes a basic clobbering approach, Martial Arts focuses on integrating movement and force in a fluid continuum. Individuals with this talent may use their hands, a knife, or any martial arts weapon that is designed to be used with this kind of combat style (quarterstaff, nunchaku, sai, tonfa, etc.). They can use any Brawling weapon at −1 levels of their Martial Arts skill. Also, Martial Arts can be used as a die modifier to escape taking damage during a fall, as well as dodging moving objects.

RANKINGS

Rank	Title	Traveller Rank
T1	Trainee	(0)
O1	Jr. Operative	(1)
O2	Operative	(1)
O3	Sr. Operative	(1)
O4	Team Leader	(2)
O5	Captain	(3)
O6	Major	(3)
O7	Colonel	(3)
O8	Lt. Commander	(4)
O9	Commander	(4)

TABLES FOR THE GENERATION OF IRIS CHARACTERS

Rank	Title	Traveller Rank
T1	Trainee	(0)
O1	Jr. Operative	(1)
O2	Operative	(1)
O3	Sr. Operative	(1)
O4	Team Leader	(2)
O5	Captain	(3)
O6	Major	(3)
O7	Colonel	(3)
O8	Lt. Commander	(4)
O9	Commander	(4)
O10	Asst. Director (candidate)	(4)
O11	Director	(5)
O12	Senior Director	(5)
O13	Regent	(6)

ASSIGNMENT TABLE

2D6	Covert Branch	Strike Branch	Ops Branch
2	Ops Assignment	Security	Staff
3	Embassy	Security	Special Duty
4	Special Duty	Security	Staff
5	Embassy	Security	Cadre
6	Ops Assignment	Security	Staff
7	Strike Assign.	Cadre	Staff
8	Infiltration	Raid	Embassy
9	Infiltration	Raid	Embassy
10	Special Duty	Special Duty	Special Duty
11	Special Duty	Special Duty	Special Duty
12	Special Duty	Special Duty	Special Duty
13	Infiltration	Raid	Embassy

Ops/Strike Assignment: The character has been assigned to this branch of IRIS for one year. Roll Assignment and Resolution as though he were a full-time member of that branch.

DMs: +1 for ranks O5+.

ASSIGNMENT RESOLUTION TABLES

Assignment	Survive	Commend.	Promote	Skill
Infiltration	7+	9+	4+	4+
Security	5+	11+	7+	6+
Raid	6+	10+	5+	5+
Cadre	4+	11+	8+	6+
Embassy	4+	12+	9+	6+
Staff	3+	None	11+	6+

Survival DMs: +1 for skill level −2 in any Branch skill; +1 for Dexterity B+; +2 for Intelligence C+.

Promotion DMs: +1 if commendation received that term.

SPECIAL DUTY ASSIGNMENTS

1. Medical School
2. Interrogator School
3. Intelligence School
4. Naval Studies
5. Command College
6. Commando School
7. Assassination Training
8. Commando School

DMs: Covert operatives +1; Strike operatives +2.

SKILL TABLES

D6	IRIS Life	Covert Branch	Strike Branch	Ops Branch
1	+1 Ed	**Technical***	**Personal Cbt***	Admin
2	+1 Int	Martial Arts	**Gun Combat**	Streetwise
3	+1 Ed	Streetwise	**Gun Combat**	**Influence***
4	+1 Int	**Vehicle**	Medical	Forgery
5	+1 Dex	**Gun Combat**	**Vehicle**	Computer
6	+1 Dex	Interog.	Battle Dress	**Vehicle**
7	+1 End	**Infiltration***	Recon	**Invest.***
8	+1 Str	**Invest.***	Tactics	Admin

Note: Cascade skills are in bold.

* = new cascade skill.

IRIS Life DMs: Covert operatives +1; Strike operative +2.
Branch Skill DMs: +2 for rank O5+.

ASSIGNMENT SKILL TABLES

D6	Infil*	Security	Raid	Cadre	Embassy	Staff
1	Demo	**Vehicle**	**Vehicle**	Recruit	Admin	Admin
2	**Vehicle**	**Gun Cbt**	**Gun Cbt**	**Gun Cbt**	**Gun Cbt**	Commo
3	**Infil***	**Gun Cbt**	**Gun Cbt**	Instr	Carouse	Inter
4	Comput	Cbt Sup*	Recon	**Infl***	Street	Comput
5	**Gun Cbt-2**	Cbt Sup*	Demo	Tactics	**Infl***	**Tech***
6	**Tech***	Zero-G Env	Cbt Sup*	J-o-T	**Invest***	Forgery
7	**Sp Veh***	Tactics	**Environ**	Leader	Liaison	**Infl***
8	**Infl***	Tactics	Leader	Leader	Inter	Tactics

Note: Cascade skills are in bold.

* = new cascade skill.

DMs: +2 for rank O5 and greater.

ADDITIONS TO MEGATRAVELLER CASCADE SKILLS

Gun Combat: Includes Combat Rifleman in addition to other categories indicated in **MegaTraveller**.

NEW CASCADE SKILLS

Influence: Persuasion, Liaison, Carousing, Streetwise.
Investigation: Interview, Interrogation, Forensic.
Infiltration: Intrusion, Stealth, Recon, Hunting.
Personal Combat: Martial Arts, Short Blade, Long Blade, Polearm.
Combat Support Systems: Battle Dress, Forward Observer, Heavy Weapons, Tac Missiles.
Space Vehicles: Pilot, Navigation, Ship's Boat, Vacc Suit.
Technical: Computer, Electronic, Sensor Ops, Jack-of-All-Trades, Communications, Medical.

MUSTERING OUT TABLES

	Covert		Strike		Operations	
D6	M Ben	Cash	M Ben	Cash	M Ben	Cash
1	Mid Pas	1KCr	Mid Pas	2KCr	H Pas	5KCr
2	Gun	5KCr	H Pas	5KCr	H Pas	10KCr
3	Gun	10KCr	Gun	10KCr	Gun	20KCr
4	+1 Int	25KCr	Gun	20KCr	+1 Int	50KCr
5	+2 Ed	50KCr	+1 Int	50KCr	+2 Ed	75KCr
6	Trav	100KCr	+1 Dex	60KCr	Trav	100KCr
7	+1 Soc	200KCr	Trav	75KCr	+1 Soc	150KCr

—Charles E. Gannon
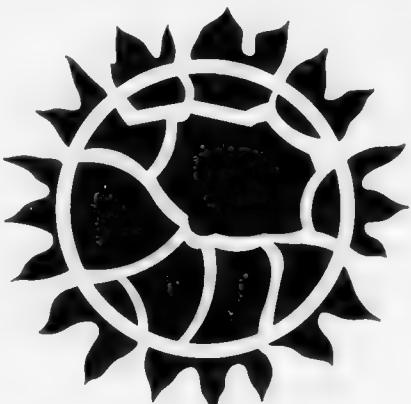
OGRE: 2300

The Kafer hovertank commander, "Maker of Orphans," kicked the back of the driver's head viciously to signal for more speed. The commander's Deathsled was leading an entire armor battalion in a drive on the last human defenders on the planet. Once it crossed this ridge, the green valley beyond would become a scene of nightmare as missiles and explosive rounds tore into the handful of human tanks remaining. The commander could feel its pulse quickening at the thought of the slaughter to come. It would be so enjoyable to watch enemy bodies burning as Kafer weapons destroyed human vehicles.

There were just a few more meters to go. As the hovertank approached the ridge line, the commander's beamer pointed toward a peaceful summer sky. A scattering of clouds hung high overhead. The hovertank's nose crested the ridge and the vehicle began its downward swing. Suddenly it veered to the left and slid to a stop. "Maker of Orphans" started to kick the driver again, but forgot that impulse as something more important caught its attention.

Coming up the slope toward it was the largest ground vehicle it had ever seen. The thing was at least 25 meters long and nearly 15 meters wide, all heavily plated with armor. Out of the front, a sensor tower rose fully 15 meters, and the whole

vehicle was bristling with guns and missiles. It was a tank, but what a tank! Its four sets of tracks crushed trees as it advanced.

"Maker of Orphans" was jolted out of its reverie as two of the missile launchers began to swing toward the Deathsled. It kicked the driver and cursed it, trying to get the hovertank moving again, but the driver responded too slowly. The missiles screamed through the air, and then the Deathsled disappeared in an eruption of metal, dirt, and flame. Greasy black smoke rose toward the summer sky like an omen as the monster tank continued up the slope toward the remaining Kafer forces.

Has your player character ever been assigned to fight what seemed to be a hopeless battle against hordes of Kafers? At such a time, have you ever wished that you had an Ogre to send against those bloodthirsty aliens? Well here is your chance to discover just how Crawlers, Bugbusses, and Deathsleds would compare to one fully armed Ogre.

As a referee, have you ever wished for a way to handle major battles in 2300 AD? This article also gives ratings for human vehicles and infantry, so that you can use the Ogre and GEV rules to run such battles. The system we used for such conversions is also included, so that you can rate new vehicles as they are

published. We have included a set of counters in this magazine as well, to represent vehicles and infantry from 2300 AD. You will find these counters on the other end of the response card insert. (Vehicles in this article come from the 2300 AD role-playing game and Aurore Sourcebook.)

USING OGRE/GEV RULES IN 2300 AD

The main thing needed to run 2300 AD battles using Ogre/GEV rules is converted statistics for 2300 AD vehicles and infantry. The table below lists each such unit with its defense strength, its movement rating, its main weapon's combat factor and range, in some cases the statistics for a secondary weapon or bank of missiles, and a unit type designation.

Weapons

Some of the weapons are listed with a multiplier. If the multiplier precedes the weapon's damage and range ratings, it means that there are that many weapons on the vehicle. For example, the CC-21 has a secondary weapon listing of $3 \times 3/2$, meaning that it has three secondary guns with a damage rating of 3 and a range of 2. Each of these guns can fire once per turn.

In the case of missiles, the multiplier follows the missile's damage and range ratings. The multiplier indicates how
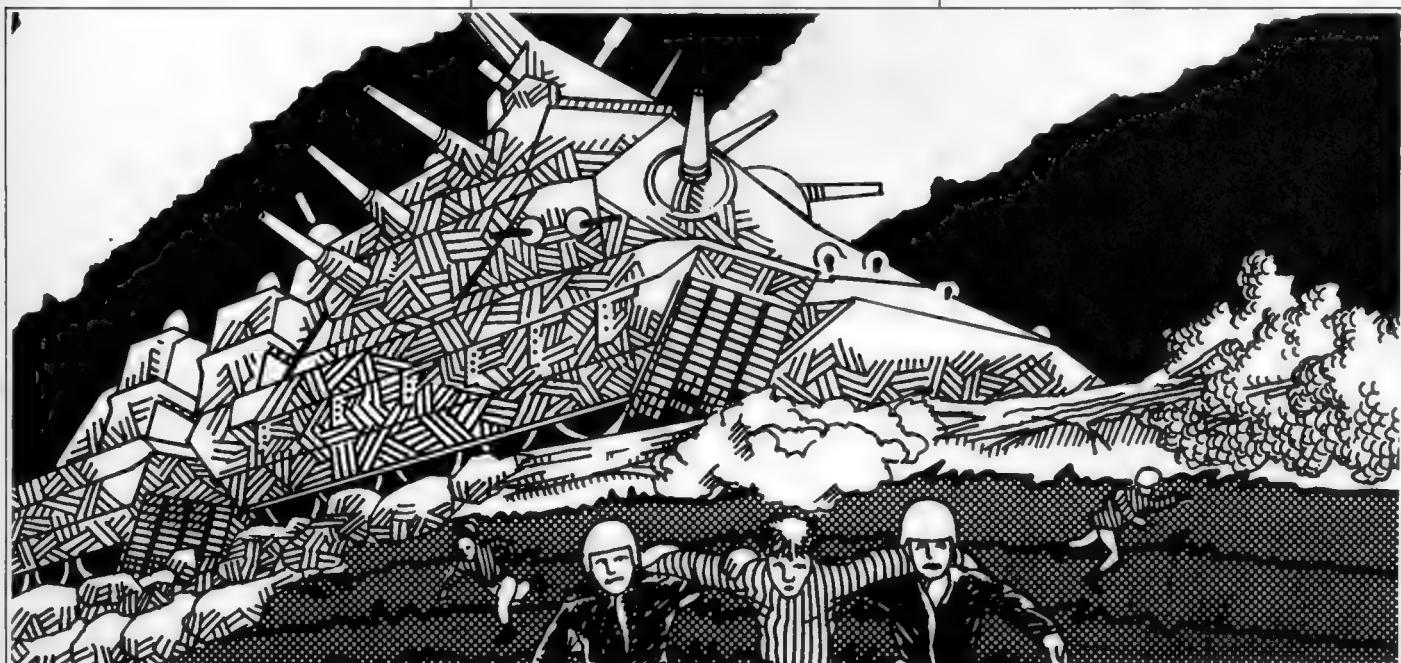
many missiles a vehicle has. For example, the Kafer Deathsled has two missiles with a combat factor of eight and a range of five hexes. (A vehicle can fire any or all of its missiles in one Ogre/GEV turn.)

Also, some weapons are listed with an attack factor of 0. Singly, these weapons can only be used against infantry, and are then considered to have an attack factor of 1. Weapons with an attack factor of 0 can also combine their attacks, just as other weapons. When combining such attacks, consider each weapon with an attack factor of 0 to have an attack value of 0.5, rounding the final total down. For example, three KZ-7 combat walkers firing all of their weapons together at one target would have a total attack factor of 4 (three main weapons with an attack factor of 1, plus three secondary weapons with an attack factor of 0, equals a total attack factor of 4.5, rounded down to 4).

Movement

There are also a couple of special notations for movement ratings. The first is that hovercraft have their total movement rating listed as two separate numbers. The first number is their movement during the normal movement phase; the second number is their movement during the GEV bonus movement phase. The other special notation for movement ratings is a number enclosed in parentheses. This indicates that the unit moves that distance every other turn.

Unit Types

The unit type designation listed at the right of the table below is not intended to be a definition of what capabilities a unit has. Instead, it is an artificial designation that indicates how Ogre/GEV terrain rules affect the unit and how many infantry or armor points the unit should cost when setting up scenarios.

2300 AD VEHICLE RATINGS

Type	Def. Rating	Mvmt. Rating	Prim. Wpn.	Sec. Wpn.	Missiles	Type
Kafer units						
Crawler	2	2	1/0			Lt. Tank
Bugbus	1	2	1/0			Lt. Tank
Deathsled	6	3/3	6/3	1/0	8/5 × 2	Hvy. Tank
Infantry	1	(1)*	0/2			Infantry
Human units						
ABR-76	2	4	3/2			Lt. Tank
AC-8	4	5/4	4/3		7/9 × 6	GEV
AC-12	5	4/4	5/3		8/5 × 4	GEV
Bessieres	2	5/4	0/1		7/9 × 6	GEV
CC-21	13	2	5/5	3 × 3/2	7/9 × 10	Hvy. Tank
Kangaroo IV	2	4/4	3/2			GEV
LkPz-9	5	5/4	5/3		10/5 × 10	GEV
LkRw-12	1	5/4			6/20 × 16	GEV
BH-21 (wlkr)	2	(1)	1/2			Lt. Tank**
Kz-7 (wlkr)	2	1	1/2	0/1		Lt. Tank**
Infantry	1	(1)	1/1			Infantry

*Although Kafer infantry moves only one hex every other turn, it may *always* move one hex to overrun an enemy unit.
**Terrain affects combat walkers as if they were light tanks, but they are purchased as if they were one squad of infantry.

The Conversion System

As future vehicles are published in the **2300 AD** line, you may wish to convert them to Ogre/GEV statistics as well. To do so, you will need the following information.

Defense: A unit's defense rating equals its frontal armor divided by 20, rounded up. But results of 0 to 0.3 become a 1; results of 0.31 to 2 become a 2; and infantry and combat walkers gain a bonus of 1 to their ratings, due to the fact that their smaller size makes them more difficult to target (especially as they can use available cover more easily than vehicles).

Movement: A vehicle's movement rating equals its cruising speed times 0.044. A combat walker's movement equals its top movement divided by 40, with fractions rounded to the nearest whole number. An infantry unit's movement rating equals its top combat movement divided by 150, rounded to the nearest one-half (but we gave the Kafers a bonus when overrunning an enemy).

Movement rating was calculated from these values rather simply, dividing four minutes worth of combat movement by 1500 meters (the size of an Ogre hex), because the four-minute Ogre/GEV turns can be expected to represent a higher movement to combat ratio than the 30-second turns of **2300 AD**. Combat walkers were calculated differently from infantry to represent the fact that they do not suffer from fatigue as infantry does.

Attack: A unit's attack value is equal to its weapon's DP value divided by 20. All values are rounded to the nearest whole number. Remember that an explosive has a DPV equal to its EP, and a tamped explosive has a DPV equal to four times its EP. Infantry attack values are calculated from the most effective single-person weapons available--in the case of human infantry, this was judged to be the Quinn-Darlan MK 2-A2 PGMP; in the case of Kafer infantry, the "Flashlight" laser was used.

Range: Gun ranges are calculated from long range divided by 1500. Missile ranges are equal to a missile's maximum range divided by 1500. All results are rounded off to the nearest whole number.

Rules Modifications

When using the Ogre/GEV rules to run mass combat in **2300 AD**, there are two modifications to be made. The first has been mentioned above, concerning weapons with an attack factor of 0. The second is that many armor units have secondary weapons and/or missiles, as well as their main weapons. Only the statistics for the primary weapon are printed on a unit's counter. If the unit has a secondary weapon, it is indicated by an "s" in the counter's lower right hand corner. If the unit carries missiles, this is indicated by an "m" in the lower left hand corner of the counter. Statistics for these weapons will have to be read off of the table above when the weapons are being used, and a record should be kept of missiles fired by each unit, much as such records would be kept for an Ogre. To facilitate the identification of which units have used missiles, the counters are numbered next to the unit name.

2300 AD UNITS IN OGRE

With the unit ratings in the table above, just as Ogre/GEV rules can be used to run **2300 AD** battles, **2300 AD** units can

Thorez

The *Thorez* is a French space plane designed primarily for short interplanetary courier duty among worlds in frontier star systems. The vessel masses 37 tons unloaded and is capable of transporting up to 863 cubic meters of cargo, with accommodations for a total of 13 crewmembers plus seven additional persons. The vessel is equipped with a fully streamlined hull for making atmospheric landings. Its aerodynamic body measures 48 meters in length, 13 meters in width, and 4.5 meters in height at the center. A pair of outwardly canted vertical stabilizers are mounted at the aft end of the hull, and a pair of stubby delta wings are located roughly amidships.

While these provide stability for atmospheric flight, they provide very limited control and lift at lower velocities. To handle short landings and takeoffs, the ship is constructed with a set of thrusters capable of very high acceleration, and a special aerobraking system which uses aerodynamic drag as well as a set of nose-mounted braking thrusters for quick deceleration. These allow the ship to travel at a fairly high approach speed with no loss in flight control. When the vessel touches down, the braking systems allow the ship to quickly come to a stop with almost no time spent in dangerous low velocity or low control flight.

The short runway requirement makes this vessel ideal for landings on frontier worlds which do not normally possess facilities for handling starship landings. Additionally, the ship was designed with specially reinforced landing gear which is well suited for landing on unimproved surfaces.

Carrying only enough fuel for about one week of normal operation, the *Thorez* is difficult to use for anything other than just interplanetary travel. However, with an additional fuel tankage in the cargo bay or in magnetically slung external tanks, it can easily be adapted for travel between star systems. Even without the extra fuel, many *Thorez* space planes commonly make short interstellar hops throughout the French Arm. Aboard ships which make such journeys, the passenger accommodations are often converted into extra living space for the crew.
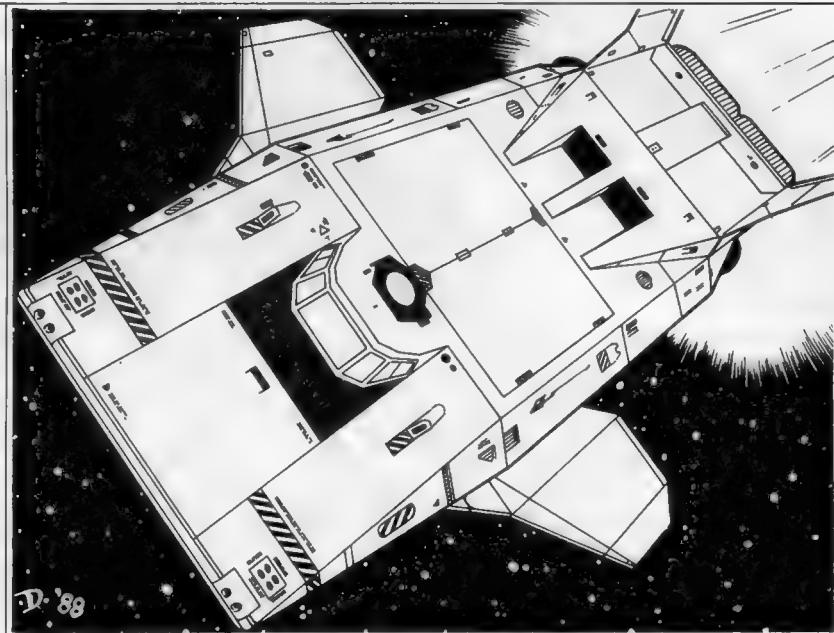
The *Thorez* receives its power from a single, one-megawatt Ariell-7041 MHD turbine. This unit is one of the smallest power plants in LeBlanc-DeSalle's successful Ariell-7000 series, and it is well known for its durability and simple maintenance requirements. During normal flight operations, nearly all of the power plant's output is channeled directly to the AEW MkIV stutterwarp drive system.

The AEW drives, manufactured by Bourveaux, are dual units which are tied together through a central controlling computer system. At full one-megawatt operation, the drive can propel the vessel at a warp efficiency of 1.99. When the vessel is fully loaded, however, the drive efficiency drops to only 1.11. With the two drive units so closely linked to one another, neither can operate independently of the other. If either unit is damaged or shut down, the other unit must also be shut down. Even though each unit is very dependable, because of the close matching requirement of the drives, the system as a whole is of average reliability.

The *Thorez* is an unarmed vessel, possessing no special armor, shielding, or hull masking. The ship, being a courier, has little need for special detection gear, so the only sensors carried aboard are simple navigational scanners. These navigational sensors are capable of picking up objects in the vessel's path, but cannot provide enough data to identify them.

One of the most popular features of the ship is its cargo bay configuration. The vessel's cargo bay can hold up to 863 cubic meters of cargo with a mass of up to 2589 tons. The bay is roughly rectangular, measuring 19 meters long by 11 meters wide, with a ceiling height of about four meters. A pair of large doors on the ceiling are opened for most loading/unloading operations and can accept an object up to nine meters wide and 12 meters long. For cargo transfer on worlds with simpler spaceport facilities, an underside-mounted ramp is built into the floor of the cargo bay. The ramp measures three meters wide and can support up to 10 tons of cargo at one time.

Recently, LeBlanc-DeSalle has made available a series of special-purpose modules designed to fit inside the ship's cargo bay. Normally taking up a limited amount of space, the modules available include a weapons module, a passenger module, a multifunctional module with movable interior partitions, a lab module, and a fuel tankage module. Most of these are designed to be easily added or removed with the assistance of a crane. For further information on these modules, see the "Technical Notes" section later in this article.

Construction History

The design for the *Thorez*-class courier was initiated on February 19, 2264, by LeBlanc-DeSalle, under contract for the

large French transportation company NTI. The design called for a fast vessel capable of transporting small amounts of passengers and cargo among frontier worlds. This meant that the vessel had to be streamlined for atmospheric landings and, since many frontier worlds do not possess the large runways necessary for landing capable interstellar craft, the vessel had to be able to land in a relatively short distance. To facilitate these needs, the *Thorez* was designed light and small, with an extensive advanced aerobraking system.

The basic design was completed by naval architects on March 20, 2267, and sent to NTI for design review. After much discussion concerning the ship's limited range and cramped accommodations, the design was finally approved with a few alterations, and the final plans were put into effect in August of 2268.

· The first vessel of the class, now christened *Thorez*, was laid down on January 19th of the following year at the LeBlanc-DeSalle shipbuilding facility at the French L-5 colony. Two months later, construction began on the second ship of the class, *Daphne*. Operations went smoothly until shortly before *Martinet*, vessel number three of the class, was to be laid down. In May, only four months after construction had begun on *Thorez*, a contractual dispute between LeBlanc-DeSalle and NTI brought the project to a sudden halt. NTI was having severe financial troubles with little sign of possible recovery. Rather than attempting to finance the project on its own, LeBlanc-DeSalle put the barely formed fleet into storage indefinitely.

Fortunately, five months later, the French government took a direct interest in the aborted project. Ships with capabilities like those of *Thorez* were still needed, and the French government decided to make sure that they would be available. After a very short negotiating period, construction began once again. On March 20, 2271, the *Thorez*, first of her class, was completed. *Daphne* was completed three months later and the two were purchased by the government for use as mail carriers and administrative transports between frontier colonies. Over the course of the year, a total of three of these ships were sold to the government, and four more were sold to private firms.

The only significant event to affect the vessel's production was an accident which occurred in 2276. This led to the replacement of a faulty component in the vessel's braking system. In the meantime, the 20 or so vessels already constructed were refitted with new components. The modified vessels were then classed as MkIIs.

Production of the *Thorez* continued at an average rate of four new vessels per year until the early 2280s, and by 2291 production had fallen to just under two per year. While construction continues today at this rate, the demand for a more modern vessel has prompted a push within L-D to either drop production of the *Thorez*, or to replace it with a newer design. However, the design's success has left L-D reluctant to discontinue it. The company did commission a development team to create a set of plans to modernize the vessel. No decision has been made as of yet, and the ship will likely be available in its current configuration for at least another decade or more.

One development that has guaranteed the 30-year-old design greater flexibility and renewed interest is the availability of special purpose pods which are designed to fit inside the vessel's cargo bay: These include the combat pod, fuel tankage pod, environmental cargo pod, and special purpose survey pod.

Vessels

More than 100 *Thorez*-class vessels are in operation. The following list shows a portion of these.

Hull Number	Name	Completion Date
C1570	*Thorez*	March 20, 2271
C1571	*Daphne*	June 11, 2271
C1572	*Martinet*	December 9, 2271
C1573		March 23, 2272
C1574		June 17, 2272
C1575		August 24, 2272
C1578	*Heron*	March 21, 2273
C1579		July 7, 2273
C1581		December 15, 2273
C1588	*Antoniadi*	September 4, 2275
C1589		February 12, 2276
C1590	*Travailleur*	June 29, 2276
C1591	*Cormier*	November 12, 2276
C1603	*Merlin*	August 13, 2279
C1605	*Cygna*	February 9, 2280
C1612	*Elan*	January 29, 2282
C1623	*Capella*	November 8, 2284

Special Dispositions

Heron, C1578: This vessel was the first *Thorez*-class ship to be lost for any reason. The vessel was destroyed on Aurora in 2276 during a landing accident in which the vessel's braking system suffered a partial failure, throwing the ship into a sharp downward spiral. Of the 17 people aboard the ship, seven were killed and eight more were injured. The ship itself crashed, caught fire, and then burned out of control. The exact cause of the failure was discovered by crash investigators five days after the accident. Their findings prompted the modification of the braking systems on all existing and future vessels of the class. The task was actually quite minor, costing very little in time and money. Modifications were conducted on newly constructed vessels at no delay in production schedules and at no noticeable increase in ship cost.

Antoniadi, C1588: This ship was the first vessel of the class to be purchased and modified for use as a survey vessel. A large portion of the ship's cargo bay was given up for the addition of an extensive set of labs and research libraries. Also, the ship was fitted with an advanced set of life sensors and cartographic scanners. Much of the remaining portion of the cargo bay is taken up by additional fuel tankage, which the vessel requires for conducting extended operations. The ship is operated by Circe Industrie, a biotechnology firm working with the close assistance of Pentapod scientists. The ship is commonly found on frontier worlds, gathering and studying local plant and animal life.

Cormier, C1591: This vessel is one of several civilian transports that disappeared during the period of the Central Asian War nearly 20 years ago. To this day, there is still no evidence indicating the fate of the *Cormier*. Some speculate that the ship was mistaken as a military vessel and destroyed, while others claim that the ship was the victim of piracy. However, most authorities agree that if either situation had occurred, something should have surfaced about it by now. Still,

nothing has ever been heard about the vessel since its disappearance.

Elan, **C1612:** *Elan* was purchased by the French Ministry of Commerce for use in antipiracy actions. The ship is the first to be equipped with a special combat pod. In fact, the design for the combat pod stemmed from the government contract for such a system aboard a *Thorez*-class courier. In order to accommodate the additional sensing equipment, power generating systems, and weapons, the ship had to undergo several modifications. These included the replacement of both cargo doors, the addition of sensor arrays on the ship's hull, and the rerouting of various fuel lines and power conduits. The vessel went into service in March of 2282, making routine patrols along the worlds at the base of the French Arm during the Central Asian War. Though it has seen a moderate amount of action over the years, the ship is still in good shape and is currently operating along the base of the French Arm to fill in the gap left as military ships are moved closer to frontier areas near the Kafer war zone.

Merlin, **C1603:** This vessel vanished in 2298 during the early months of the Kafer War. The ship was last reported in the Eta Bootis system at the time of the Kafer Invasion. After the Kafers were driven from the system in 2298, a search was implemented for the vessel. However, no signs were ever found on any planet or anywhere in the system. As it is difficult to find such a small object in such a vast area, it is quite possible that the ship or its remains are somewhere in the Eta Bootis system. However, active searches for the vessel have been called off long ago. The·*Merlin* was not believed to have been carrying any passengers or cargo of particular importance or value, and it is generally believed that the vessel was captured by the Kafers. They may have also captured the crew alive as well, though no one has any explanation as to why the Kafers would want the ship and crew. While this is all pure speculation, it is the commonly held view among most authorities.

Basic Statistics: *Thorez* MkI and MkII

The following section details basic statistics.

Dimensions

Length: 48 meters
Width: 26 meters overall, 13 meters maximum hull width
Height: 11.5 meters overall with landing gear extended, 4.5-meter median hull height
Tonnage: 387 metric tons unloaded, 2976 metric tons loaded

Armament

None

Electronics

Thomson/GSD Alpha II Navigational Sensors

Detection Characteristics

Radial Area: 74.6 square meters
Lateral Area: 219.5 square meters
Radiation Emissions: 1.13 MSU

Engineering Systems

Power Plant: Ariell-7041, one-megawatt MHD turbine
Fuel: 165 cubic meters, primary fuel; 93.2 meters, thruster fuel

Drive: AEW MkIV Jerome Drive system

TECHNICAL NOTES

The hull of the *Thorez* is a box-frame construction with a wedge-shaped nose construction and custom-structured aft section. This gives the hull a fully streamlined design, making it practical for atmospheric flight. It is equipped with delta wings with an overall span of 26 meters, and vertical stabilizers for complete atmospheric maneuvering ability.

The hull itself is constructed from a special low profile synthetic material produced by CIBA-Geigy for LeBlanc-DeSalle; the material, Velleron-C, is very similar in properties to one produced in America by DuPont Corporation which is commonly used in modern ship production today. Velleron-C has a density of approximately 2.98 g/cm³—less than metallics and basic synthetics, though not as light as advanced synthetics and composites. One advantage of this material is its high energy-absorption characteristics, which tend to make the vessel less visible to active sensor searches.

Internally, the ship is divided up into three major sections: the forward or passenger section, the cargo section, and the aft section. The forward section is almost completely contained in the wedge-shaped nose of the vessel. The upper deck of this section contains the bridge and the breaking thruster system. The deck below is the passenger deck, but it also contains the forward landing gear well and the navigational sensor system. The cargo bay section begins just behind the nose and makes up about half the length of the ship. This section contains little more than the bay. The aft section runs from the aft end of the cargo bay to the stern of the ship. This section can be further divided into a crew section and an engineering section. The crew section is a two-level area containing accommodations for the ship's regular crew of 13. This area is almost completely surrounded by the ship's engineering section, which contains the power plant, stutterwarp drives, thrusters, fuel tankage, aft landing gear wells, and so on.

The utilization of the hull's interior volume is shown below.

VOLUME UTILIZATION TABLE
Thorez MkI & MkII

Component	Volume
Sensors, Navigational	5
Power Plant, 1 MW	20
Thrusters	3
Stutterwarp Drive	10
Work Stations, Bridge	40 (5 WS)
Work Stations, Engineering	14 (2 WS)
Accommodations, Crew (13 × 25cm³)	325
Accommodations, Passengers (7 × 25cm³)	175
Life Support	4.2 (6 weeks)
Fuel, Primary	165 (1 week)
Fuel, Thruster	93.2
Cargo	863.3
Cargo Bay Bracing	8.7
Hull (L.P. Synthetic)	18
Streamlining Waste	180
Total Volume	1924.4

Crew

The *Thorez*-class courier carries a standard operating crew

of 13. These crewmembers are divided up among the ship's seven work stations. Five of these work stations are located on the bridge and are continually manned around the clock. The remaining two work stations are located in the engineering bay. These stations are primarily used for maintenance and repair, but they also monitor and control the ship's power plant. As the MHD turbine operates safely on its own with little need for intervention, the engineering work stations do not need constant manning.

STANDARD REQUIREMENTS

Personnel	Work Stations
Captain, First Officer	Con-Bridge
2 Navigators	Nav-Bridge
2 Helmsmen	Helm-Bridge
2 Comm Operators	Comm-Bridge
2 Computer/Comm Operators	Computer/Comm-Bridge
2 Engineers	Engineering/A-Engineering
1 Engineer	Engineering/B-Engineering

Accommodations for the ship's passengers and crew are extremely cramped making life rough. To compound the uncomfortable lifestyle, the ship's lack of spin habitats leaves the crew to live and work in zero-G for their entire time in space. Each person aboard the vessel has only 25 cubic meters of standard living space, including recreational space and extra work space. This doesn't affect the crew to a great extent except when the ship is in space for extended periods of time. On many ships, the passenger facilities are used by the crew to provide extra recreational and living space, thus making life considerably more bearable. The ship's design as a space plane is probably its major saving grace. Because the ship is capable of landing on planets with atmosphere, the ship and its crew spend much time in the comfort of gravity.

Engineering

The following charts detail engineering aspects.

DRIVE EFFICIENCY CHART

Power to Drives	Total Cargo Tonnage		
	None	100 tons	2589 tons
.1 MW	.92	.86	.38
.2 MW	1.16	1.08	.60
.3 MW	1.33	1.23	.67
.7 MW	1.77	1.64	.90
1 MW	1.99	1.84	1.11

FUEL CONSUMPTION TABLE

Power Plant Time	1 MW
Minute	10 kilograms
Hour	600 kilograms
Day	14.4 tons
Week	100 tons

Cargo Modules

Combat Module: The combat module was first introduced in 2282, during the early part of the Central Asian War. The module takes up almost exactly half of the *Thorez*'s cargo bay and masses 363.2 tons. The module, as with most custom models, is of an "L"-shaped design and takes up the port side and the aft portions of the cargo bay. This design allows unhindered access to the floor-mounted loading ramp.

The module provides the ship with a passive sensor system, a single Guiscard LL-98 laser mounted in a masked turret, and two missile bays, each capable of carrying a single Ritage-1 missile. Weaponry and sensors are monitored and controlled from the Tactical Action Center, also located within the combat module. To meet the added power requirements of the weapon and sensor systems, the module is equipped with a two-megawatt MHD turbine. Additional fuel tankage is also provided, keeping the ship's normal operating time at one full week.

Unlike most of the modules which followed it, the addition of the combat module is a semi-permanent matter, requiring the complete replacement of both cargo doors with a single six-meter-wide by 12-meter-long door. Other modifications include cutting a hole in the cargo bay ceiling to accommodate the addition of a single masked turret. Also, control cabling, fuel lines, and power conduits are rerouted so as to allow direct hookup to the connectors on the module. Finally, a series of sensor elements are added to the surface of the ship's hull.

The added systems have been designed in such a way that it is nearly impossible to tell that the ship is combat equipped. This is achieved through a system of advanced masking of the second power plant and through the use of a low cross-sectional passive sensing array. Only close visual scrutiny will reveal the ship's masked turret and passive detection gear.

The total cost of this package is Lv1,392,000, which includes a low-signature passive sensor array and a masked turret. A module with a standard passive sensor array and an external weapons mount costs approximately Lv225,000 less. In either case, modifications that cost about Lv100,000 must be made to the vessel.

Basic Fuel Tankage Module: This module is the most common of the special-purpose modules found for the *Thorez* today.
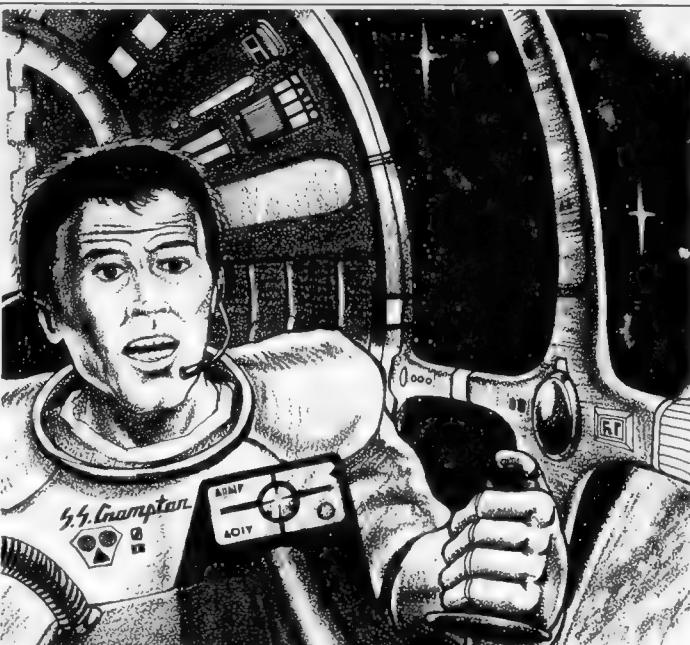
This module is the smallest, measuring roughly four meters long by 5.2 meters wide by four meters high, and it can carry up to 82.5 cubic meters of hydrogen fuel or most other bulk liquid substances. The total mass of a fully loaded fuel tankage module is 54 tons. Located at one end of the rectangular module is a special connector for refueling of the module and for transferring fuel from it to the ship's main fuel tankage. However, the *Thorez*-class courier is not constructed with a fuel system connector in the cargo bay so one must be added if fuel transfer is to take place during flight operations. This procedure requires a minor construction or repair facility and costs somewhere in the neighborhood of Lv5000.

General Purpose Cargo Accommodations Module: This unit is the second most commonly produced module for the *Thorez*. The GPCAM is essentially a single airtight shell measuring roughly eight meters wide and four meters high. The interior is a single large room which is custom-partitioned to the buyer's requirements at the time of purchase. In most cases, the module is divided into an upper and lower deck, with each deck further divided into two or more rooms. Access between decks is through a hatchway located near the main entrance.

The module takes up 216 cubic meters of volume and masses 32.2 tons, configured. Internal space available is 213.84 cubic meters. The basic cost of this module is Lv75,600. The basic configuration fee is Lv7560. Any special features that are installed in the module cost an additional Lv3780 each. Such features might include the construction of an airtight compartment, the addition of heavy-duty elevators or large cargo doors, and so on.

STANDARD GAME DATA

The following section outlines standard game data.

Ship Annex Data

Thorez MkI & II: *Warp Efficiency:* 1.99 (1.11 loaded) *Power Plant:* 1MW MHD turbine *Fuel:* 100 tons, sufficient for one week of operation *Range:* 7.7 *Mass:* 387 tons (2976 tons loaded *Cargo Capacity:* 863 mm³ *Comfort:* −2 *Total Life Support:* 22 *Price:* Lv3,950,000

Thorez MkI & II w/Combat Module: *Warp Efficiency:* 1.99 (1.11 loaded) *Power Plant:* 1MW MHD Turbine and 2MW MHD turbine *Fuel:* 100 tons, sufficient for one week of operations *Range:* 7.7 *Mass:* 750.2 tons (2976 tons loaded) *Cargo Capacity:* 432 mm³ *Comfort:* −2 *Total Life Support:* 22 *Price:* Lv5,442,000

INTERNAL DETAILS

The following section outlines internal descriptions.

Internal Descriptions

1. Avionics and Communications: This equipment occupies the most forward section of the ship's tapered nose. Here the vessel's minimal electronics gear is located. Access to these is through external panels located on the topside of the nose or through the use of access panels located in the passengers' galley.

2. Passengers' Galley: This one-meter-deep service area contains an oven, refrigerator, water dispenser, dish washer, garbage disposal, and storage space for food and additional cooking utensils. This section is partitioned off from the passengers' lounge by a set of sliding wall panels.

3. Passengers' Lounge: This five-meter-square room is centrally located in the vessel's passenger section at the front of the ship. The lounge serves as both a recreation center and a dining commons for the ship's small number of passengers. This room is equipped with a full set of foldaway furniture which can be easily stowed to make room for other furniture or activities which require the full room. At the forward end of the room is a set of sliding panels, behind which is the passengers' galley.

4. Main Airlock/Boarding Passage: There are two of these airlocks located near the bow of the ship on both the port and starboard sides. These airlocks serve as the main passenger and crew boarding pathways. This room is further detailed in the "Detailed Locations" section later in this article.

5. Forward Landing Gear: This closed-off section of the hull contains the forward landing gear and machinery. The access into this compartment is normally through the main doors on the underside of the ship. In an emergency, entry can be made through an airtight access panel in the aft end of the compartment.

6. Double Occupancy Staterooms: These rooms possess very plain accommodations which include two fold-down sleeping berths, a fold-down desk and foldaway chair, a number of cabinets for the storage of personal belongings, and a single, shared fresher. Accommodations are further detailed in the "Special Locations" section.

7. Single Occupancy Staterooms: These rooms possess all of the features of the double occupancy rooms, except of course that they are built for only one person. Even so, the rooms give their occupants a bit more private space and room for personal belongings.

8. Thruster Machinery: These two compartments house the ship's main thruster equipment. The thrusters are used to provide maneuvering capabilities for entering and leaving orbit and to provide power during atmospheric flight. The compartments are completely sealed off from the rest of the ship except for fuel and control lines. Any work done on the thrusters must be done from outside the craft.

9. Aft Landing Gear: The aft landing gear is located in two compartments near the tail end of the ship. The aft landing gear is slightly larger than the forward landing gear, but is in all other respects identical to it. Access panels near the crew's lounge allow entry into the aft gear wells, though normal entry is through the gear doors on the underside of the ship.

10. Cargo Bay: This large room makes up almost one-half of the ship's total internal volume. The bay measures 11 meters across and 19 meters long with a ceiling height of about four meters. At the aft end of the bay is a one-meter-deep recessed section which measures seven meters across and reaches from floor to ceiling. Near each of the two corners of this recess is a door. Each of these lead into airlocks, which then lead into the crew's lounge. The main cargo doors are located in the bay's ceiling. These doors swing outward to the sides, creating an opening nine meters wide and 12 meters long. Controls for these doors are located at the captain's station on the bridge.

In the center of the forward end of the cargo bay is a loading/unloading ramp. This ramp is six meters long and three meters wide and can support loads of up to 10 tons. When open, the ramp slopes down toward the bow of the ship and has a vertical clearance of about two meters. The ramp is operated by a set of controls mounted at the bottom starboard

corner of the ramp. While this controls the ramp's operation, it cannot be used to pressurize or depressurize the cargo bay. The only controls for doing this are located on the bridge at the captain's station, which also possesses the ramp override controls as well as the topside cargo door controls.

11. Crew Lounge: This multi-purpose room is centrally located within the crew section in the aft section of the ship. The room is commonly used as a library, gymnasium, general purpose lounge, game room, and conference room. All furniture located in the lounge is designed to easily fold away into special wall compartments when not in use.

12. Crew's Mess: This room is roughly equivalent in size to the crew lounge located on the lower deck. At the forward end of the room is a small auto-preparation galley which is slightly more sophisticated than the popular Vend-A-Meal food dispensers found in many commercial places. The galley unit can dispense a total of 144 meals before it must be refilled.

In the center of the room is a table which folds away flush with the floor. Two recessed handles allow the table to be easily lifted and locked into place. Two benches are similarly designed and are located at the sides of the table. At the aft end of the room are cabinets used for general storage.

13. Bridge: This is the control center for the ship's flight operation. This dimly lit room is located near the bow on the upper level. Details about the bridge can be found in the "Special Locations" section.

14. Breaking Thrusters: These compartments contain the ship's primary breaking thrusters used to quickly slow the vessel for landing on short runways. The compartments contain the thrusters, fuel, and control equipment, and they can only be accessed through heavy panels on the exterior of the hull.

15. Secondary Access Passage: This is one of the corridors which runs along the sides of the ship's cargo bay connecting the aft section to the bow section. The secondary passage is more accurately referred to as the passenger deck access, as it runs directly between the crew's mess to a hatch over the passenger deck.

16. Primary Access Passage: This is the second of the corridors which connect the aft section of the ship to the bow section. This passage leads directly from the crew section to the bridge. A hatchway on the bridge provides access to the passenger deck, but the most commonly used method of reaching the passenger deck is through the secondary access passage on the port side of the ship.

17. General Storage Rack: This rack is located next to the main crew section hatchway on the upper deck. The rack is used for general purpose equipment storage. On many ships it is used to store spacesuits and other related equipment. Other ships use it to store general cleaning and maintenance equipment, weapons, and other common equipment.

18. Life Support System: This is the central unit which provides the ship with heating and cooling. Special chemical scrubbers draw toxins out of the air and maintain proper oxygen levels. The system is equipped with an emergency backup power unit which will keep the system operating at minimum levels for up to 24 hours. The unit is automatic and keeps the backup power unit charged off the ship's main power supply.

19. Laundry Facilities: This closet-sized area contains the ship's laundry equipment. The unit includes a heavy-duty washer and dryer combination which is specially designed to work in zero gravity as well as normal gravity. The unit is kept behind a sliding door panel.

20. Bridge Relay Access Tunnel: This one-meter-wide, one-meter-high tunnel provides access from the bridge to the primary control lines which are all channeled through this tunnel. The inside is unlit except for a set of dime reference lights along the forward wall. Also located on the forward wall are numerous control circuit panels. These panels are protected from accidental damage by clear high-impact plastic covers.

On the aft wall of the passage is an access panel which leads into the cargo bay. This panel is normally locked, and a key is kept by the ship's captain, first officer, and chief engineer.

21. Engineering Control Room: This room, commonly referred to as simply "engineering" is the monitoring and control room for the ship's power plant and drive systems. Details for this room can be found in the "Special Locations" section.

22. Lower Engineering Bay: This room is actually part of a larger room which houses the ship's one-megawatt MHD turbine and stutterwarp drive units. The lower bay is simply the area located below the access catwalk. From here, engineers can conduct normal inspection, maintenance, and general repair of engineering systems.

23. Engineering Access Airlock: This tiny room serves as the access passage between the engineering control room and the upper engineering bay. The room contains a ladder leading up to a hatch in the ceiling. This hatch leads directly onto the catwalk in the upper bay. The room also functions as an airlock, providing passage not only to the engineering bay, but also to the outside of the ship through a hatch in the floor. All airlock and hatch controls are located inside the room, with a duplicate set of controls on a panel in engineering control. However, because of the circuitry design of this system, the controls in the airlock have priority over those in Engineering Control.

24. Upper Engineering Bay: This area is the upper-half of the large bay which provides access to the upper portions of the engineering systems. The catwalk is surrounded by a meter

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of high removable railing. Beyond this is a two-meter drop to the floor of the lower bay. Access into the upper bay is through a hatch in the floor of the lower bay. Access into the upper bay is through a hatch in the floor of the forward end of the room, which opens into the engineering access airlock below.

25. Cargo Bay Airlock 2: This airlock is one of two connecting airlocks which allow passage between the cargo bay and the crew section. Additionally, a hatch in the floor of this airlock leads directly outside the ship. Airlock controls are located outside the door on the crew lounge side. However, an override control is located inside the airlock and will prevent all doors from opening and depressurization from occurring.

26. Cargo Bay Airlock 1: This is the main airlock used to access the cargo bay. This airlock is identical in size to cargo bay airlock 2 but does not have a hatch leading outside the ship. The controls for this airlock are located inside, next to the cargo bay entrance. Similar controls are located outside both doors, but these are secondary controls which the main controls inside can override.

27. Access Rooms: These two rooms are no more than simple accessways which lead from the upper deck to the lower deck of the passenger section. These access rooms are normally locked on the passenger section side, so no one can enter without the proper eletronic key. All crewmembers normally carry such a key.

Special Locations

Bridge: The bridge is a small, dimly lit, six-meter-long compartment which is located on the upper level near the bow of the ship. From here, all flight, navigation, and communication operations are controlled. There is a total of five work stations located here which include the command, helm, navigation, communications, and computer station. Each of these stations is manned 24 hours a day. The following paragraphs contain detailed descriptions of each of the work stations located on the bridge:

Helm: The helm station is located at the right side of the flight operations panel at the front of the bridge. From here the helmsman, more commonly referred to as the pilot, can control all stutterwarp flight as well as thruster-powered atmospheric flight. While this panel does not have control over the ship's MHD turbine power plants, it does have instrument readouts indicating its operational status.

Command: This position is located at the left side of the flight operations panel at the front of the bridge and is manned at all times by either the captain or the first officer. From here the watch officer can maintain command over all operations of the ship. This station is equipped with several displays which can tie into any readout on the bridge and can also show the status of any system monitored by the ship's computer. Additionally, this station has a minimal set of helm controls that take over in case the helm panel becomes damaged. Aboard most vessels of this type, the captain and first officer are both pilot-trained.

Navigation: This station is located directly behind the command station on the bridge. From here the navigator has all the necessary control instruments to program the ship's stutterwarp control computer for interstellar and long duration interplanetary flight. The ship's navigational sensors are also controlled from this station. Also, the work station has a built-in

computer data bank which keeps basic information on all nearby star systems and their planets. This databank is also available through the computer/comm station.

Comm Station: This station is located at the back of the bridge on the starboard side. The station is equipped with multi-frequency transmission and reception equipment capable of operating on up to six frequencies simultaneously. Additionally, the communication systems can be set to monitor any range of frequencies at regular intervals. For the transmission of secure messages, the station is equipped with a tight-beam comm laser system. This device can lock onto a laser receiver and transmit secure messages without the threat of being jammed or intercepted.

Computer/Comm: The single computer station is located at the back of the bridge on the port side opposite the main comm station. This station is normally configured as a second communications panel, but it is completely capable of serving as a backup for any other station on the bridge. Also, the station has complete access into the ship's information bands and monitoring systems. This station is normally manned by communications personnel who are also cross-trained in computer operation.

Crew Quarters: Primary crew quarters aboard the ship are cramped, double occupancy rooms. Space is a precious commodity aboard *Thorez*-class ships. To conserve this rare resource, much of the furniture throughout the ship, especially in the crew quarters, is designed to neatly and completely fold out of the way. Each person's quarters include a sleeping berth, a foldaway desk and chair, storage cabinets, and a small, shared fresher.

The fresher is the space vessel's version of the bathroom. Each fresher is equipped with a zero/normal gravity toilet and an enclosed zero/normal gravity shower. Each fresher also has a limited amount of space for personal gear.

A few single occupancy staterooms are set aside for the crew, but these are generally reserved for the ship's senior officers.

Main Airlock/Boarding Passages: These two rooms are tiny, measuring about one meter wide by two meters long, and serve as both airlocks and as main entranceways. At the outboard side of each of these rooms is a small closet which is used for spacesuit and tool storage. These closets are not airtight, although they will hold a breathable atmosphere for several minutes at a time. On most ships, the closet contains two general purpose spacesuits. A connecting fitting on the wall is used for the purpose of filling the suits' oxygen tanks and also for recharging any power supplies which happen to be built into the suits. On the forward wall of the airlock is located a panel which controls both pressurization and depressurization of the airlock, and also controls operation of the retractable ladder.

Engineering Control Room: Called "engineering," this room is located forward of the engineering bay which houses the power plant and stutterwarp drives. From this room, the ship's single, one-megawatt MHD turbine power plant can be monitored and controlled. The room contains two engineering work stations which are manned at irregular hours when the engineers test and adjust fuel feeding systems, cooling systems, and safety monitoring systems. Automated monitoring systems can sound alarms if anything unusual occurs.

—C. W. Hess

Upper Level

14 c 13 c 14
c
c 20 c c
c

15 10 16
c

c

12 7 17 7 7
c c c
c

8 18 19 8
6 6
c c

Lower Level

c 21 c c 23 c
22
c c

Upper Level

24 c

ENGINEERING CONTROL

c
c c
c

BRIDGE

CON HELM

NAV

COM/COMP COM

Lower Level

1
2
6 c 3 c 6
4 c 4
c 5 c
7 c 6
c
27 c 27 c
c DN c
Ramp

10

c c
26 c 25
9 c c 9
6
11
8 c 8
6 6
c c

KEY

⬡ Hatch down (floor)	⬕ Sliding doors
⬗ Hatch up (ceiling)	▓ Fuel tankage
⊟ Access panel	c Communicator panel

COMBAT MODULE
Lower Deck

MISSILE BAYS

ENGINEERING CONTROL

STARBOARD AIRLOCK

SAMPLE QUARTERS
Double Occupancy

COMBAT MODULE
Upper Deck

MISSILE BAYS

TAC

TUR

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INAP

At the end of WW III and during the recovery, both Argentina and Mexico transformed themselves into major industrial powers. No longer were they the struggling, debt-ridden, Third World nations of the past 20th century. Both nations progressed economically, politically, and militarily. Argentina began to vigorously exploit the markets of South America, which had been abandoned by the Americans, Europeans, and Japanese. Mexico also exported to South America but was content to allow Argentina to be dominant because of its markets in North America. Latin America was also becoming a major industrial region.

Both nations also expanded their armed forces. Mexico's forces were built to defend the territories of Texas, New Mexico, Arizona, and Southern California, which it reacquired from America, and which it believed were stolen by America in the early 19th century. Mexico had fought two wars to control these territories, and only through military strength had it been able to keep them. Argentina also expanded its armed forces as its economic rivalry with Brazil increasingly became a military one.

Yet, for both of these nations, it seemed history was cruelly repeating itself. Toward the end of the 22nd century, the great power nations of the Earth were exploring, colonizing, and ex-ploiting the stars. International power and prestige began to be measured by a nation's presence in space. The race for the stars was on, with Mexico and Argentina losing. If something was not done soon the Latin American nations would be left behind to become second-rate powers. Therefore, Mexico and Argentina began to cooperate in the exploration of space. Nevertheless, despite these early attempts at cooperation, both nations were frustrated in their efforts to colonize worlds because of their failure to discover a garden planet. This failure caused Argentina, in 2162, to protest against the sole colonization of Alpha Centauri, which was a garden world, by ESA members. Argentina went to war over the issue and was backed by Mexico. After the war both nations determined that full cooperation between them was their only viable way to remain in the race for the stars.

As a result, in 2164 the *Instituto Nacional De Astronomia Practica* (INAP) was born. Its purpose was to have one overall agency to conduct the colonization of Alpha Centauri. The colonization was made peacefully under the escort of Argentina's fledgling space navy.

The first efforts to colonize Alpha Centauri began with much fanfare and high hopes. Argentina and Mexico leased six colonial transports to bring settlers to Santa Maria, as the joint colony on Tirane was to be called. These transports were escorted by Argentina's space navy. Ostensibly this was done to protect the transports from outside threats, but in reality it was a show of force and determination on the part of Argentina and Mexico. This use of the Argentinian Space Navy set the tone for the continued military involvement in the colonization and exploration which was to characterize INAP activities.

Both governments at first devoted significant resources and effort to the colonization program. For Argentina, the colonization program became a large drain on its resources, which were already badly depleted by the recent war fought with the ESA.

As part of the program, a massive public relations program was initiated to mobilize the population behind its colonization effort. The first sailing of the six transports to Santa Maria was a huge media event. The government news networks carried live pictures of the colonists and the ships as they left for the new colony. Unfortunately, disaster struck when one of the six transports vanished during its journey to Alpha Centauri. Sensor logs from the other five ships later indicated that on August 13, 2168, at 0530 hours, contact was lost with the colonial transport *Pancho Villa*.
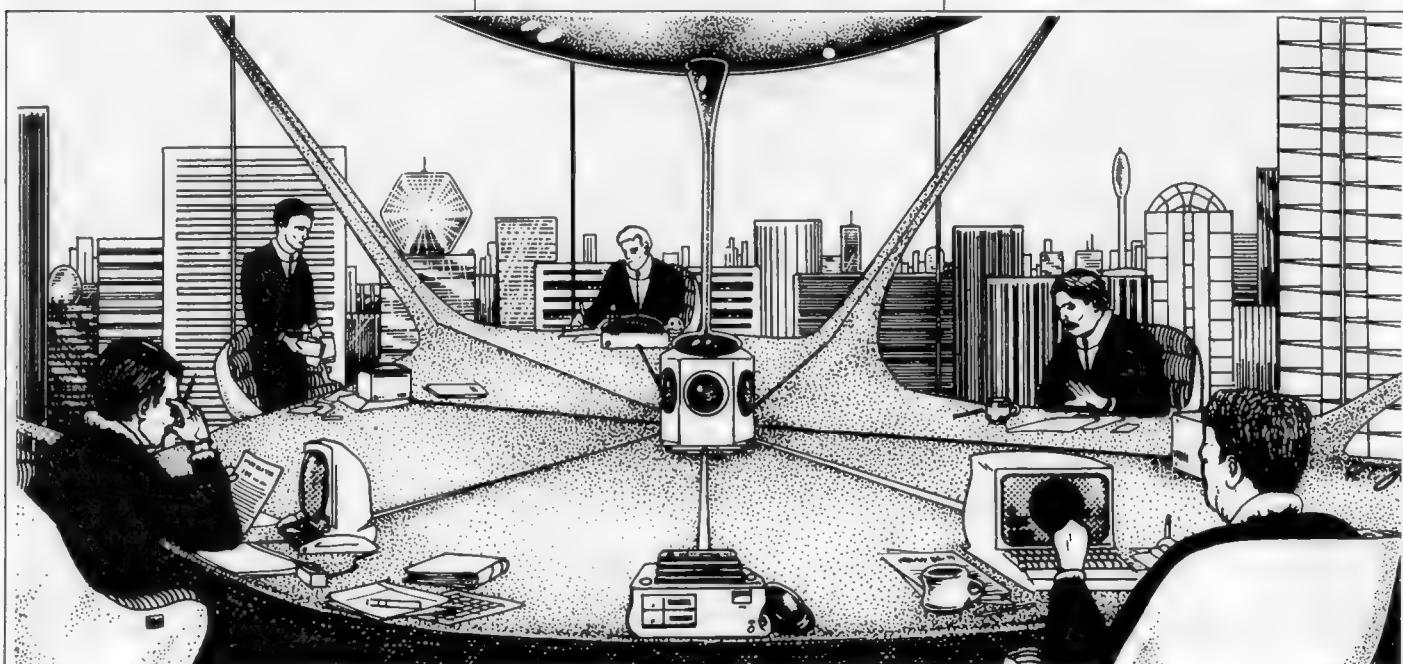
Many explanations have been offered for the disappearance of the *Pancho Villa*. These vary from the theory of a collision with a miniature black hole, to the claim of the wrath of God. The most widely accepted theory is that the transport suffered a catastrophic stutterwarp failure which left it marooned in an area of the galaxy too far away to reach or communicate with Earth.

The loss of the *Pancho Villa* profoundly destroyed public support for both nations' colonization program. Despite this, both nations remained fully committed to the colonization of Tirane, and with the remaining five transports, a base colony was established on a site surveyed by earlier INAP teams.

In the first year the colony successfully developed agricultural production. It was hoped to make the colony self-sufficient in food production and then later expand production so that grain could be exported to other colonies. The colony ships had also brought over a small herd of cattle and horses. The horses were to be used in cattle ranching and as a cheap source of transportation. To the Argentinians the horses were a throwback to the days of the gauchos, who were their equivalent of the American cowboy.

By the second year the colony had grown to a population of 5000. Agricultural production was expanding, and the colony's herds had grown to 4000 horses and 1000 head of cattle. At the end of this year the colonists had also completed a small fusion power plant. Prospects for the new colony looked very bright.

Disaster struck again in the third year of the colony. A virulent strain of a form of hoof-and-mouth disease destroyed 50 percent of the colony's livestock in six months. At the time, scientists were perplexed as to the source of the disease because all of the livestock had been innoculated against known diseases. Later research has shown that a virus which preys on a life form indigenous to Tirane and similar to cattle and horses had mutated to affect these Earth livestock. Normally the virus is not fatal to the Tiranian life form, but in its mutated state it is deadly to Earth cattle and horses.

Despite the setbacks, the colonists endured and struggled on with their colony. Unfortunately, economic realities were against the colony's survival. Although the colony was self-sufficient in food production, it was not producing a surplus to export. This resulted in a growing trade deficit and economic recession for the colony. As the economy worsened, immigration to the colony declined, and in later years the colony suffered emigration from it to other colonies on Tirane. INAP took steps to prevent this exodus but was unsuccessful.

The last major tragedy for the colony was the Santa Christophos School disaster in 2180. This disaster provided the impetus for the later amalgamation with the New Canberra colony. Unknown to the builders of the Santa Christophos Grade School, the site chosen was geologically unstable. Ten years later, a large sink hole appeared, swallowing up two full classrooms and killing 132 children. This catastrophe was the last straw for a colony which had been in a slow decline. Economically the colony was in ruins, and demographically the colony was losing population each year. Faced with these hard realities, the political leaders of Santa Maria chose to amalgamate their colony with the neighboring and successful Australian colony. Today this has resulted in a thriving and viable colony.

An interesting side note to the Santa Christophos School disaster is the church and shrine built over the original school site. Three school children who survived the disaster claimed they were warned by a vision of the Virgin Mary moments before the sink hole appeared. After the disaster, the three school children continued to have visions of Saint Mary and to perform miracles in her name. These miracles continued throughout the lifetimes of the children, until their deaths of old age. Now the site has become so famous that a church was built, and millions of faithful travel from light-years away to visit and pray at the shrine.

The experience of the Santa Maria colony has had an important effect on INAP's colonization policies and programs. This has resulted in a more conservative and cautious philosophy towards colonization than is reflected in the policies of other starfaring nations. This cautious philosophy has prevented failures such as the Santa Maria colony, but at the cost of slowing Argentina's and Mexico's colonization efforts.

> *T*he last major tragedy for the colony was the Santa Christophos School disaster in 2180.

As the success of INAP grew, other Latin American nations began to cooperate with INAP. This cooperative attitude has resulted in large numbers of citizens from other Latin American nations eventually coming to reside in Mexican and Argentinian colonies.

The Incan Republic had been the main cooperating nation with INAP, but in 2277 the Incans withdrew all cooperation from INAP because of a conflict over economic issues. The Incans did not believe they were getting a fair share of the growing trade between the colonies and Earth.

Losing Incan support was a blow to the prestige of INAP, but it was decided that the Incans would eventually return on terms favorable to INAP. The only Latin American nation INAP will not cooperate with is Brazil. Argentina, which has fought three wars with Brazil, still bears great enmity toward that entity.

Shortly after INAP was created, it was given another mission. Although both nations had managed to gain a toehold in the stars, leaders of both nations believed that they were losing the stars. A decision was made that since the race could not be won through conventional means, unconventional means were necessary. Thus was established INAP's Covert Operations Department. INAP was chosen because its public activities of research and colonization provide excellent cover for covert operations. This section of INAP has operated so successfully that both Argentina and Mexico now devote most of their intelligence resources to it.

Activities from 2300 to the Future

INAP's activities are divided into four main areas: These are Colonization, Exploration, Research, and Covert Operations. INAP's colonization efforts have been focused on Montana (Omicron2 Eridani) and Kwantung (Tau Ceti). INAP has at

its service five *York*-class colonization vessels, which have been renamed *Buenos Aires* class, from Argentina. These vessels will form the backbone of any future colonization.

As mentioned before, INAP follows an extremely conservative policy for colonization. Before colonization begins, INAP will have sent at least two survey teams to the prospective colony world. After the world has been thoroughly surveyed, a site is chosen, and a base colony will be established. The ships carrying the colonists and equipment for the base colony will be escorted by military ships from Argentina or Mexico. Throughout the colonization process, important decisions are made by the Colonization Council (a five-member group which reports directly to the Director of the Department of Colonization). Other decisions not referred to the Colonization Council will be made at the highest level possible, with review by their superiors.

Since most of the Latin Finger has been explored, INAP has been making plans to explore other stars in the Chinese Arm. Also under consideration are missions to AC +12 1800-213 and DM −21 1051. With these last two explorations, INAP hopes to open up exploration and colonization for a new area of the galaxy.

INAP also funds and promotes research projects. Most of INAP's efforts are concentrated on improving its stutterwarp technology and ship design. INAP also concentrates heavily on weapons research and other scientific research with a potential for military applications. Most INAP research which is carried out is done because it may lead to military uses. INAP is also interested in research on the Kafers and has been funding missions to gather information about them. INAP is interested in the Kafers because of the possibility that they have unknown and possibly superior technology.

Earth is the location for the bulk of INAP's research facilities. Two universities, one in Mexico City, the other in Buenos Aires, Argentina, conduct most of the research on Earth. INAP has also been heavily funding a project to build a modestly sized "atom smasher" for its own research of sub-atomic particles. This project is located in the northern part of Mexico.

Outside of Earth, INAP has two facilities on Montana. The first facility is studying the ecology of Montana. The second is drilling what will become the deepest well in known space. This deep well-drilling project is for the purpose of studying volcanic activity on Montana as a possible source of energy. On Syuhlahm (Zeta Tucanae) there is a small lab and team doing research on this planet's life forms to determine whether their natural protections against radiation can be adapted for humans.

One interesting side note to INAP research funding is the relatively large amounts of money for research into paranormal activities such as ESP, telepathy, telekenesis, pyrokenesis and other paranormal phenomena. Most of INAP's research into paranormal phenomena is conducted on Earth. No breakthroughs have been announced, but research continues.

The first three activities of INAP are publicly acknowledged. The last activity of INAP, covert operations, is kept secret under the cover of the other three. INAP was originally created to promote the national interests of Mexico and Argentina, and that purpose still remains. Although many nations know of or suspect this other side of INAP, they have been unable to do anything publicly because of INAP's status as a legitimate foundation. These nations have chosen instead to use covert action to meet INAP's threats.

INAP's other legitimate activities provide an excellent cover for INAP's agents. INAP's Covert Operations Department places most of its agents as employees of INAP's other legitimate activities. Agents provided with INAP covers are able to have access to INAP starships, research facilities, and bank accounts.

Most of INAP's cover operations involve intelligence gathering, industrial spying, and counter-intelligence. INAP also conducts "black" covert operations. These include—but are not limited to—sabotage of hostile foreign facilities, training and supplying guerilla forces, and assassination. INAP is careful in its black covert operations missions never to elicit a major response from its victims. These missions are meant to delay and harass, never to cause a large disaster which would require the victim to respond in kind and possibly directly towards Argentina and Mexico. This policy is exemplified by two classic
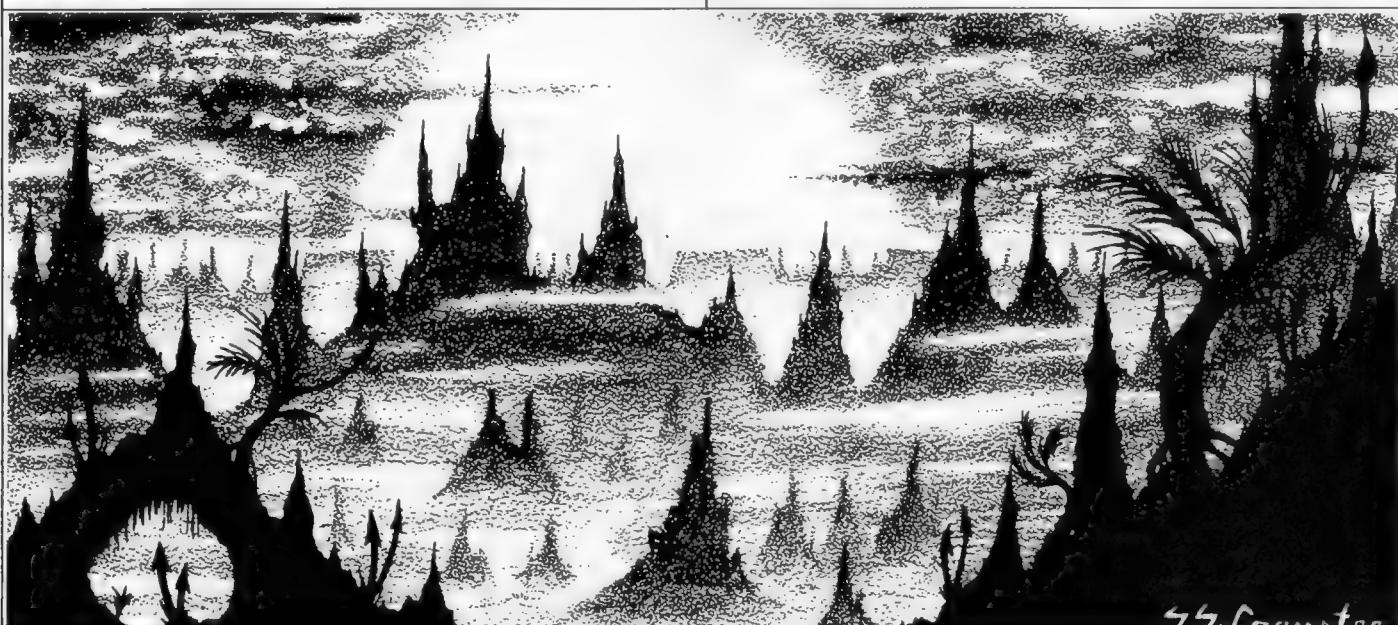
INAP missions. In the first, INAP agents placed a fungus in corn seed to be sent to a new American colony. The fungus prevented the use of the seed. The colony did not starve because of this, but it delayed the development of grain exportation by the colony. In the second example, INAP agents were instrumental in the collapse of a small British trading company. Boycotts and labor strikes formed by INAP agents coupled with the manipulation of the trading company's stock on the World Stock Market forced the company to declare bankruptcy. This resulted in intervention by the British government, which has since poured millions of pound sterling into the failing company to keep it afloat.

Revenues and Organization

INAP receives most of its funds from the nations cooperating with it. A majority of these funds come from Argentina and Mexico. INAP's extensive landholdings on Omicron 2 Eridani and Tau Ceti provide additional revenue. Argentina and Mexico also provide supplemental aid by making their own facilities and ships for INAP's use.

INAP's organization is characterized by centralized control and strict lines of authority. In practice this means that most personnel are unwilling to try new ideas or to take chances. Often things are done in a certain way because they have always been done that way.

INAP is headed by a commissioner who is appointed by Argentina and Mexico. Originally it had been intended to have a new commissioner appointed every five years, and this was done for 90 years until the appointment of Pedro Arias Garcia Sanchez in 2254. Pedro Garcia, who is the current commissioner, has been reappointed eight times. This has made him the longest serving commissioner in INAP history. Garcia is a very charismatic man and is known by his nickname, "El Padrone." This natural charisma, coupled with his long term of office, has made him a virtual dictator of INAP. El Padrone is now 85, and rumors are circulating that he is planning to retire. If this does occur he would most likely be succeeded by the current Director of Covert Operations.

INAP's activities are divided into departments headed by directors. The commissioner, along with the directors, makes the important policy decisions. The one exception is covert operations. The commissioner and director of covert operations make the decisions solely. Throughout its middle and lower echelons INAP has a strong militaristic and bureaucratic organization. Strict emphasis is placed on rank, discipline, and regulations. All departments have a quasi-military ranking system and uniform dress code. For instance, scientists are ranked Lab Technician, Research Assistant, Scientist, and Senior Scientist. Rank is very important in INAP because prestige, power, and influence are all determined by it.

Adventures

INAP's many activities keep it always in need of experienced and qualified personnel. Players may be hired directly by INAP or through intermediaries. INAP's exploration and colonization efforts keep it in need of parties to explore, survey, and study star systems. INAP is always interested in sending research teams to investigate new phenomena. INAP has also become interested in the Kafers. They will pay for any information about them and will fund missions to seek more information. Although INAP is interested in all details of the Kafers, they are specifically interested in their weapons technology.

INAP also hires outside members to perform covert operations. This outside hiring is usually done through intermediaries, and those employed will not be told they are working for INAP.

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*I*NAP is headed by a commissioner who is appointed by Argentina and Mexico.

INAP may also be used as an opponent for the players. The players may find themselves up against INAP during their activities because of INAP's covert operations. At first the players may not realize that it is INAP who is behind all of their difficulties, but as they become more involved, they will track them down to INAP. The best way to involve INAP in this manner is by having players working for British or American employers. Most of INAP's activities are directed against these two nations. The United States and United Kingdom are singled out by INAP because of the traditional enmity of Argentina and Mexico to these nations.

Most of INAP's legitimate activities can be a front for more sinister plots. INAP's deep well-drilling project on Montana could be for research not into geothermal energy but into new weapons able to destroy planets. INAP's interest in the Kafers could be not only to gain information about superior weapons but also to ally with the Kafers.

Joining INAP

Referees might have players begin already working for INAP, especially if they are from a Latin American nation. If so, INAP will provide valuable money, resources, and information to the players. In return, they will be expected to obey orders from INAP and perform INAP missions. Players can also attempt to join INAP. Those from Latin American nations will be at an advantage, except for Brazilian citizens. Those who are American or British will be at a disadvantage.

In general, INAP is willing to accept new members. New members will be put on a short trial period, usually six months to one year, during which the new member will be closely watched. If accepted after the trial period they will be made a full member. The process is different for members who will be placed in covert operations. These will go through a security clearance and a yearly review. Citizens of Brazil, America, and the United Kingdom will not be accepted. Citizens of Argentina and Mexico are preferred. New members will be given the lowest security clearance and will be closely supervised and monitored.

Conclusion

INAP unique and interesting because of its ties to Argentina and Mexico. The stars have become another arena in the struggle for global power and prestige. INAP is a tool and weapon in this struggle. This special nature should provide the referee with many exciting adventures.

—Dave Finnigan

The 2300 AD Revision

In the June 1988 issue of *Isaac Asimov's Science Fiction Magazine*, in his "1987 Science Fiction Games of the Year" review article, Matthew J. Costello rates **Traveller: 2300** as one of the year's eight best science-fiction games. He says, "**Traveller: 2300**...is almost a daring role playing game. These days, role playing seems a field filled with licenses and quirky appeals to a narrow audience. **Traveller: 2300**, on the other hand, sets out to present state-of-the-art interstellar role playing. With finesse, polish, and a mind-blowing star chart, the game succeeds admirably." We thank Mr. Costello for his applause, and we appreciate positive reception that the game has received from role players in general, but we have a confession to make—we believed that **Traveller: 2300** needed an extensive revision. By now, most of you will have seen that revision, titled **2300 AD**, in the stores.

For those of you who have already purchased the revision, this article will identify what changes were made and why. For those of you who have the old edition, this article will also explain not only why your edition is not outmoded, but also what you are missing from the revision. For those of you who have never played either version of **2300**, you may learn from this article something of what makes the game the "daring" venture that it is.

FIRST IMPRESSIONS

If you hold **Traveller: 2300** in one hand and **2300 AD** in the other, you will immediately notice three differences. One is that the **2300 AD** box is bolder, with deep reds, yellows, and blues against a starry black background. In this case, you *can* "judge a book by its cover"— the polish of the box reflects the polish of the rules and information inside.

Next, you will notice the difference between the titles. Some people original-ly confused **Traveller: 2300** with **Traveller**. Not only are the rules to the two games much different, the games are set in different "universes," with completely different alien races, different routes of travel between the stars because the FTL drives in each game operate on completely different theoretical bases, different technologies (there are no grav plates in **2300 AD**, for instance), and different themes. **Traveller** spans the Milky Way galaxy and concerns humanity's struggles to maintain a civilization over that broad reach of space. **2300 AD** reaches stars just beyond 50 light-years from Sol and concerns humanity's struggles just to survive among those stars.

The third difference you will notice between **Traveller: 2300** and **2300 AD** is that the latter game is much heavier. It is literally almost twice the game at the same price. **Traveller: 2300** had a 48-page *Player's Manual*, a 49-page *Referee's Manual*, an eight-page book of forms, an eight-page adventure, an eight-page *Near Star List*, and an eight-page book of examples and supplementary material entitled *Understanding 2300*, for a total of 129 pages of material. **2300 AD** has a 92-page *Adventurer's Guide*, a 108-page *Director's Guide*, and a 32-page play aids booklet containing forms and tables, a programmed adventure, and the *Near Star List*, for a total of 232 pages. Both games contain the Near Star Map, of course.

INTERNAL CHANGES

The watchwords for changes to the text have been: (1) Keep the rules that work (following the old adage, "If it ain't broke, don't fix it."); (2) Add rules that are missing; (3) Make sure all rules mesh together; (4) Give plenty of examples; (5) Provide illustrations of all equipment; and (6) Make it easy for the reader to get into the game.

Those directives have been translated into a box that is [illegible]

operating. By the time the reader has completed creating and equipping his character, he is mentally prepared to learn more about the 24th century by reading the history and political geography that follow. Likewise, the new sidebar format breaks the text up into main rules and supplementary material such as play examples, tables, and tasks, making assimilation much easier for the reader.

The *Adventurer's Guide*

There are many major changes from the old *Player's Manual*. Primarily, these have been additions to the old rules. For example, the character creation chapter now includes both a dice-rolling method and a point-allocation method. At any point along the road of character creation, the player can use one system or the other. Also, an experience system has been added, as well as a system for keeping track of accumulated fame or infamy. The basics of these two systems are given in the *Adventurer's Guide*, and they are further explained in the *Director's Guide*. A few new skills and careers have been added, and gravity types have been defined, with gravities listed for each colony and enclave. A short description of each colony world is also given, so that players will know something about the homeworld they choose for their character. Frontier and Core are defined as well—for those of you who have been wondering, Core worlds are Earth and Tirane (Alpha Centauri); all other worlds are Frontier worlds.

Next, as has been mentioned, all equipment, weapons, armor, and vehicles are illustrated. The equipment chapter has been expanded considerably as well—it is now 12 pages long. Basic equipment has been expanded, as have purely futuristic equipment and examples of Pentapod products. (Even more equipment will be available later [illegible]

one fully developed adventure, "Tests of the Godking," is both an exciting adventure to play through, with several twists to its plot, and a good example of how to flesh out an adventure outline (or ideas which referees come up with by themselves). The campaign, called the *Long Shot* campaign, after the ship to which player characters can be assigned, is nicely supported by the color poster/ship plans to the *Long Shot*, a converted passenger liner.

THE RULES UPGRADE

The rules upgrade section of the *Campaign Pack* is only four pages long, but those four pages make quite a difference to the game. The upgrade provides details on changes in the *Star Wars* personal combat and ship combat sequences, further detailing the sequencing of a combat round. The new rules clarify when reaction rolls are made, and introduce a revision in dodges—there are now full dodges and combat dodges. Haste actions, which allow characters to perform certain actions first during the combat round, are also added to the combat sequence. Difficulty numbers have been changed from a set number to be rolled for a certain level of difficulty (5, 10, 15, or 20) to a range of numbers from which the referee may determine the actual goal number to be rolled to succeed in an action. Rules for combining actions are also introduced which make the barrage fire capabilities of stormtrooper squads much more formidable to player characters. Further, the rules upgrade also changes the stun damage result and the ship ionization damage result. Stun or ionization no longer means that one can take no action during the following round; instead, actions for the rest of the current round and the next round are performed at −1D. Other rules changes and clarifications are presented on stance, grenades, and surprise, and changes have been made in certain charts (Astrogation Chart, Weapons Chart, Difficulty Numbers Chart, Healing Table, and Optional Fire Modifiers Chart, among others).

This four-page section is provided separately from the campaign book, although it is mentioned in the campaign book as being a center pullout section (evidently a last minute change was made before printing). The rules upgrade is probably the most useful section in this pack, the equivalent of an errata and a second edition packed into a small but concise and lucid section. It would probably benefit the referee most to photocopy the section, cut it apart, and tape the revisions over or near the relevant sections of the *Star Wars* rules book. (Permission to photocopy is not given in the upgrade, though. You should probably write to West End to get it.) Securing the upgrade to the inside back cover of the rules book might suffice.

THE REFEREE'S SCREEN

The screen is printed on sturdy cardstock and is large enough to provide the referee with roughly two square feet of table space, which can be blocked from the players' lines of sight. The four color panels which face the referee contain all the charts used in *Star Wars: The Roleplaying Game* and are fully compatible with the rules upgrade enclosed in the *Campaign Pack*. Outlines of the new breakdowns of the combat and starship combat sequences are given, and the screen includes a copy of the Spacecraft Performance Data Chart from the *Star Wars Sourcebook*. The charts are arranged in fairly logical groupings on each panel, and are readable and easy on the eye. The only problem I noticed was in the Damage Summary Table. The "less than" and "greater than or equal to" signs have been accidentally left off the section of the table which shows the relationship between damage rolls and strength rolls. The correct signs can be penned in, as adequate space for them has been left; the original Damage Results Table in the back of the *Roleplaying Game* can easily be used as an example of which symbols belong on which lines. The side of the screen which faces players contains the expanded Equipment Cost Chart found in the *Sourcebook*, and all the information needed to generate a character for the game.

THE SHIP PLANS/POSTER

Often full-color poster/maps are included with role-playing game accessories; however, the maps are frequently marked with keys and contain information that only the referee should really know. Therefore, only the referee gets to enjoy the map, and it is awkward to use, as it will not fit behind a referee's screen, being sized to hang on a wall. It is delightful to encounter in this product a poster/map which can be used and perused by both players and referee without any adventure information being given away. The ship plans provide a concrete picture of one of the characters' steady adventure environments and a capsule description of non-player characters who crew the ship is provided on the plans as well.

EVALUATION

This *Campaign Pack* is definitely worth the money for anyone who runs the *Star Wars* game. All of its elements are of high quality, and are extremely *practical*.

Paranoia Second Edition Form Pack.
West End Games. $8.00.
Design: **Steven Gilbert**
Editing: **Paul Murphy**
Graphics: **Stephen Crane and Susan Kramer**
Mind Control and Fear: **The Computer**
Supplement for *Paranoia* Second Edition.

This form pack is another in the continuing series of West End's off-the-wall supplements for *Paranoia*, their game of a humorous post-holocaust (type unknown) future directed by the dictatorship of a paranoid-schizophrenic computer aided by an overblown bureaucracy, and an inept and ignorant workforce. The *Form Pack* contains 18 forms (in triplicate, with real carbon paper) and a short adventure in outline form (called a "Code 7" adventure in West End's terminology). There are enough forms provided to play the adventure four times.

THE FORMS

The types of forms featured exemplify the exaggerated bureaucracy present in *Paranoia*, as well as the general atmosphere of the game. The three forms featured in the *Form Pack* are the "Form Request Form 2212/HHK," the "Equipment/Weapon/Vehicle Request Form," and the "Equipment Complaint Form B4379-10(398)/7R." Ideas for further humorous forms, which the referee might decide to create on his or her own, can be found on the "Form Request Form," and include the "Treason Confession/Spontaneous Organ Donor Release

Form 1/777B," the "Security Clearance Breach Authorization Form," and the "Fine Assessment Form 18BR-6/A" among others. Other "fictitious" forms mentioned include the famous "Chapstick Cap Replacement Form (Part 1 of 7)" and the "[Deleted for Security Reasons] 237/34.FIDKJ/11-A," which I found myself chuckling over repeatedly as they are so typically *Paranoia*ish in nature. The forms provide many ways to catch players up in the kind of "Have you stopped beating your wife yet?" questions which the Computer loves to ask to entrap the potentially treasonous. Various NPCs' reviews of the player characters' answers provide opportunities for role playing.

THE ADVENTURE

The adventure, entitled "A Hole in the Complex," is given in outline form with a flowchart diagram to aid referees in following the logical progression of the action as to locale. No mapping of the locales is attempted, but neither is it really necessary, and individual referees can easily flesh out the given plotline with maps if they feel a desire for them. Enough of a unique characterization of each of the major non-player character's personalities and skills is provided in the adventure outline for a referee to create a distinctive depiction of each of them (their habits, attitudes, manner of speech, etc.). While not a virtuoso piece of adventure construction, the adventure provided is fun to play through and quickly paced, as well. It is recommended as an introductory adventure for new *Paranoia* players and their characters, and I would agree that it is quite suitable for this purpose. It is not too complex for new referees to handle either, although it would be helpful to both new referees and players to review the combat system and skill usage before playing through the adventure by trying a practice combat run and one or two skills rolls.

EVALUATION

The *Form Pack* is a solid product, though not a terribly meaty one. Although enough forms are provided for repeat usage, I wonder whether the contents fully merit the price. One might be tempted to purchase a secondhand copy from a referee who had already played through the adventure. However, don't completely pass over this product, as some of the priceless, tongue-in-cheek humor on the forms is not to be missed.

—Julia Martin

also be used in *Ogre/GEV* battles. There are a few recommendations to be followed, however.

The first is to not use **2300 AD** infantry in *Ogre/GEV* battles. *Ogre/GEV* infantry can run a mile every two minutes in shrapnel- and radiation-protective suits while firing weapons. Infantry in **2300 AD** wear lighter armor, are more dependent upon available cover, and are slower. Firepower is equivalent, but **2300 AD** infantry cannot run two-minute miles.

Second, when designing scenarios, count **2300 AD** vehicles as double to determine unit costs. **2300 AD** vehicles are tougher than their counterparts in *Ogre/GEV*, and **2300 AD** missiles have longer ranges and do more damage.

Finally, do not keep track of missiles used by **2300 AD** armor units during such battles. Treat them as *Ogre/GEV* missile tanks, having effectively unlimited missiles available.

—Lester W. Smith and Frank Chadwick

PUT YOUR WANT AD HERE. Any Traveller, Twilight: 2000, or 2300 AD related ads accepted, subject only to space available and good taste. Buy or sell out-of-print booklets. Advertise fanzines. Find people to play against. **Challenge** *Classifieds,* **Challenge** *Magazine, PO Box 1646, Bloomington, IL 61702.*

Players Wanted: A Dallas **Traveller** group is looking for select adult players for campaign game. Contact Alex Ingram, (214) 357-3216.

Wanted: Will players and/or referees of **2300 AD** in the Shenango Valley area please contact Robert L. Downs, 1065 Baldwin Ave, Sharon, PA, 16146. I've never played RPGs before, but I'm anxious to start.

Inquiry: Experienced **Traveller**, **2300 AD**, and **Twilight: 2000** referee soon to relocate to London, England. Would anxiously like to hear from players or referees of these games who live within 40 kilometers of London and who would like to game with a British-born American. Will be arriving around 21 November 1988. Please Write R. Scott Byerly, 2010 Yorktown Court North, League City, TX, 77573, USA.

Variant: Discontinued RPG fanzine including **Traveller** deckplans, character classes, equipment. All 16 back issues only $5.00 postpaid; sample issue $1.00. Gary Reilly, 395 Wimbledon Rd, Rochester, NY 14617.

Wanted: Runequest II material, such as *Borderlands, Pavis, Big Rubble, Runequest Companion,* etc. Please send a list of items, noting condition and price (please allow for shipping) to: Per Eklund, Violstigen 16,153 00 Jarna, SWEDEN

Chief Tactical Officer: Starbase Two (Central/Southern United States) unit of Starfleet Command is looking for gamemasters and players for play-by-mail campaign using **Traveller**/*Star Trek* rules. Contact: Commodore David Johnson, 1417 Vanderbilt East 610, Fort Worth, TX 76112-8957.

Adventurers: Players wanted for existing play-by-mail campaign loosely based upon **The Traveller Adventure.** Contact: David of Tenelphi, 1417 Vanderbilt East 610, Fort Worth, TX 76112-8957.

Wanted: Atlas of the Imperium. Please write quoting price and shipping costs to: Roger Myhre, Odvar Solkbergso 136, 0973 Oslo 9, NORWAY.

HELP! I've just started **Twilight: 2000**, and I need to know if I'm doing it right. Players and referees in the Groton-New London, Connecticut area please call 445-7027 and leave a message. Groton-New London area only, please. My name is Bill.

Wanted: *Atlas of the Imperium* and *The Traveller Adventure.* Send prices to Allan Hopkins, 715 Donovan Ave., Victoria, BC, V9B 2A4, Canada.

Wanted: *High Passage* 1; *JTAS* 1-12, 17, 18; *Traveller's Digest* 1-3; *Fifth Frontier War.* Send info to Jimmy Simpson, 1735 Ridgeview Drive, Arlington, TX 75012.

Wanted: *High Passage* 1, *Far Traveller* 1, *Travellers' Digest* 1, 2, & 6, *Beyond Sector* and *Vangard reaches* from Paranoia Press. Also want *Alsan Mercenary Cruiser* (FASA), *Atlas of the Imperium* (GDW), and *Pilot's Guide to the Drexilthar Subsector* (Gamelords). Write Patrick J. Hoye, 343 Washington St, Holliston MA 01746 or call (617) 429-1285 or (617) 429-4476.

Wanted: MegaTraveller or **2300 AD** programs for the Atari ST in FastBasic or ST Basic. J. D. Law-Green, 1 Whitelands, Rawdon, Leeds, W. Yorks, LS19 6BU, ENGLAND.

Players Wanted: Looking for players in Western Massachusetts interested in Chaosium's *Ringworld* RPG. Also interested in general SF/RPGs. Call Rob at (413) 549-5947.

Miniatures for Sale: I have a Ral Partha *High Frontier* set, new without shrinkwrap. Contains 40 15mm-figures ideal for **Traveller**—18 humans in vacc suits, 22 aliens. $10 plus $2 shipping. Rob Caswell, 950 N. Pleasant St, Box 35 Amherst MA 01002.

Security Leak Magazine: Dedicated exclusively to **Traveller** printed quarterly, subscriptions are $10.00 (US) in US, Canada, APO, and FPO, $2.75 singly (elsewhere $12/year, $3.25 single). For additional information write: The Security Leak Magazine, 4200 Park Place 217, Tyler, TX 75703-1822, USA.

World Generator: Generic program for IBM PCs and compatibles with CGA graphics. Includes Turbo Pascal source code, instructions, free upgrade. £5 (Britain and EEC), $10 (USA). Marcus L. Rowland, 22 Westbourne Park Villas, London W2 5EA, England.

Wanted: TCS players in SAC metro area interested in playing in an islands sector campaign. Contact Steve McCoy, 3605 Pleasant Valley Rd., Placerville, CA 95667, 626-9046.

North Coast Role Playing (NCRP): A new amateur fanzine with articles on **Traveller**, **MegaTraveller**, **2300 AD**, **Twilight: 2000**, and other major game systems. Sample copy $1.25, subscriptions $6 for six issues. Make checks payable to Barry Osser/NCRP, 0118 F St. 1, Eureka, CA 95501.

The No D&D Gamers in Denver run **MegaTraveller** biweekly. Contact Chet at 166 S Rosemary St, Denver, CO 80231. Grownups preferred, and my wife says we don't have enough women in the group...so female scouts needed.

Wanted: A copy of the *FCI Consumer Guide* by FASA, either an original or a photocopy will do. Send price to Alan Siegwarth, 4071 Forestwood Dr., San Jose, CA 95121.

CHALLENGE Next Issue

- "City Maker" for **Twilight: 2000**.
- "The Victorian Age" in **Space: 1889**.
- "The Spice of Life" for **MegaTraveller** characters.
- "A World Invaded" during the Kafer War in **2300 AD**.
- The "AFT-1B 'Afterburner' "—a new 'mech for *BattleTech*.
- "Starports for the *Star Trek* Universe."
- Plus *Renegade Legion, Paranoia,* and more!